OCT 17 1938

MOTOR AGE

CHILTON PUBLICATION
DEVOTED TO THE INTERESTS OF THE INDEPENDENT REPAIR SHOP

OCTOBER
1938

IN THIS ISSUE

King for a Day

Pictured here are John Cobb (left) and Reid Railton, designer of Cobb's car. For one day Cobb held the world's land speed record with the terrific pace of 350.2 m.p.h. he made on Sept. 15 at Bonneville Saltbed. Capt. Eyston recaptured the record when, on Sept. 16, he burned up the course to average 357.5 m.p.h.

New Cars

Pictures and descriptions of the 1939 models of six different makes. More to come next month.

Anti-Freeze Facts and Figures

A table of cooling system capacities by makes and models, including information on quantities of anti-freeze necessary for protection at various temperatures.

Marvel Carburetor

Another picture story, giving full details on servicing models C-2 and C-3.

STOCK CHAMPIONS FOR "COLD WEATHER" CAMPAIGN

THE CHAMPION SPARK PLUG COMPANY is again inaugurating a Fall campaign to prepare motorists for winter driving. Here is a splendid opportunity for wide-awake dealers to cash in on extra profits.

When ducks fly south, and frost, sleet and snow announce the coming of winter, "It's Time For New Champion Spark Plugs." That will be the theme of this Fall campaign.

Saturday Evening Post and Collier's will carry two color pages—Liberty, as well as a group of monthly magazines dominant space—featuring "Easier Starting" and telling how important a new set of Champion Spark Plugs is in cold weather.

Prepare to cash in on this cold weather advertising. Attractive posters, as illustrated above, but in full color —18 x 31 and 10 x 22—are available and can be secured from the Champion sales representative or through your jobber. Display these posters prominently and be sure you have an ample stock of Champions. Remember, there is no more profitable stock investment than Champion!

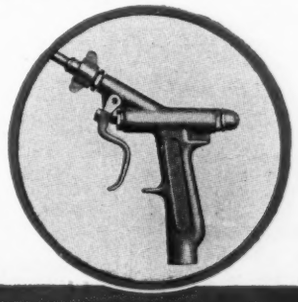
CHECK AND CLEAN SPARK PLUGS WHEN YOU CHANGE OIL

YOU NEED A NEW GREASE GUN—HERE IT IS

U. S. Model JB 25 Silver Scout Lubricator is a beauty in looks, in operation, and in handling. It's a gun that will render perfect service without the least bit of trouble, and that's unusual. It conserves your air supply, making life easier and longer for your air compressor, that too is something new for a gun. Pistol grip handle makes it much easier for operator, no wrist strain. Faster on the trigger and in operation. It's modern in design and looks. A perfect gun perfectly good for years to come.

Holds original 25 pound container or 65 pounds of lubricant in the bulk.

NET PRICE
$98.00



It costs no more to buy the Silver Scout—but costs far less to operate it. Can be purchased through your jobber for 27c per day. Profits on one extra daily grease job will more than make your payments.

THE U. S. AIR COMPRESSOR COMPANY

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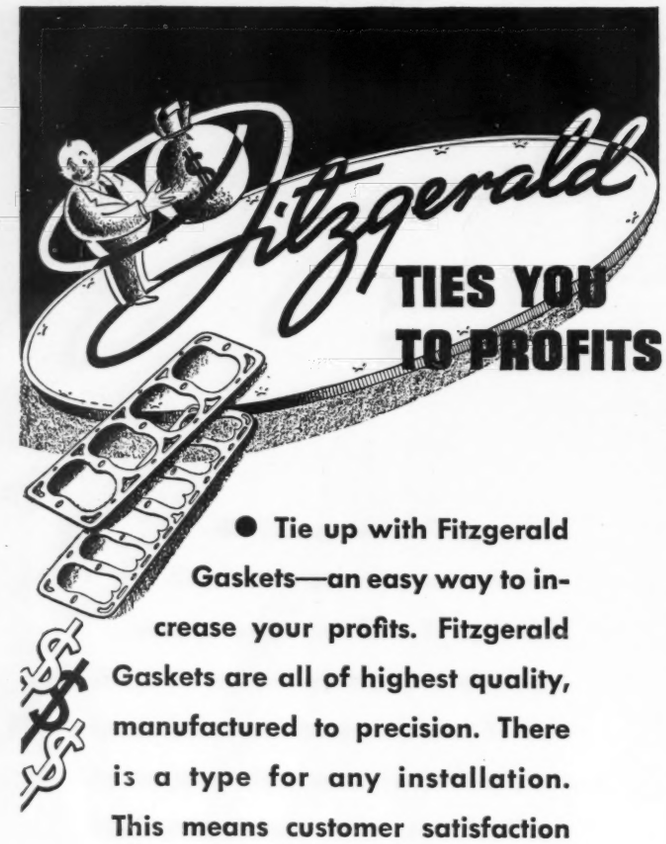

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The complete Fitzgerald service also includes everything you need—gasket sets; modern packaging; racks, cabinets and board assortments for effective display and convenient stocking; merchandising helps. Get in on these bigger profits now—standardize on Fitzgerald. Your jobber will give you prompt, efficient service... The Fitzgerald Manufacturing Company, Torrington, Conn.—Branches, Chicago and Los Angeles—New York Office—Canadian Fitzgerald, Limited, Toronto.

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THE COMPLETE LINE THAT COMPLETELY SATISFIES

MOTOR AGE

DEVOTED TO THE INTERESTS OF THE INDEPENDENT REPAIR SHOP

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MOTOR AGE

OCTOBER 1938

SHOP TALK

Peeping Tom

It wasn't exactly a peeping Tom stunt that we did to get the advance stories on some of the new cars, but it wasn't far from that. Along with a bunch of other editors we attended special previews of the new cars at the various factories. As a result of those previews we are able to present the details of some of the new cars in this issue. The remainder of the cars will be described in the November issue. At first glance it would seem that the main changes in the cars is in appearance. However, after lifting a lot of hoods and crawling underneath, one finds a lot of improvements.

Strip Tease

"While personally I think MOTOR AGE would be better without illustrations of lightly clad girls, I don't know what we would do without the Clearing House," writes J. C. Warren of Kaoota, Tasmania. Well I don't know how things are in Tasmania, its a little off the beaten path for me, but here in the good old U. S. A. mechanics seem to like automobiles and girls pretty well streamlined. Guess I'll try and promote a trip to Tasmania, to make a survey on just what the mechanics like in the way of illustrations. But it's strange how often the boss can say no! So I guess I'll have to stick around and do the best I can from this end.

Naked Truth

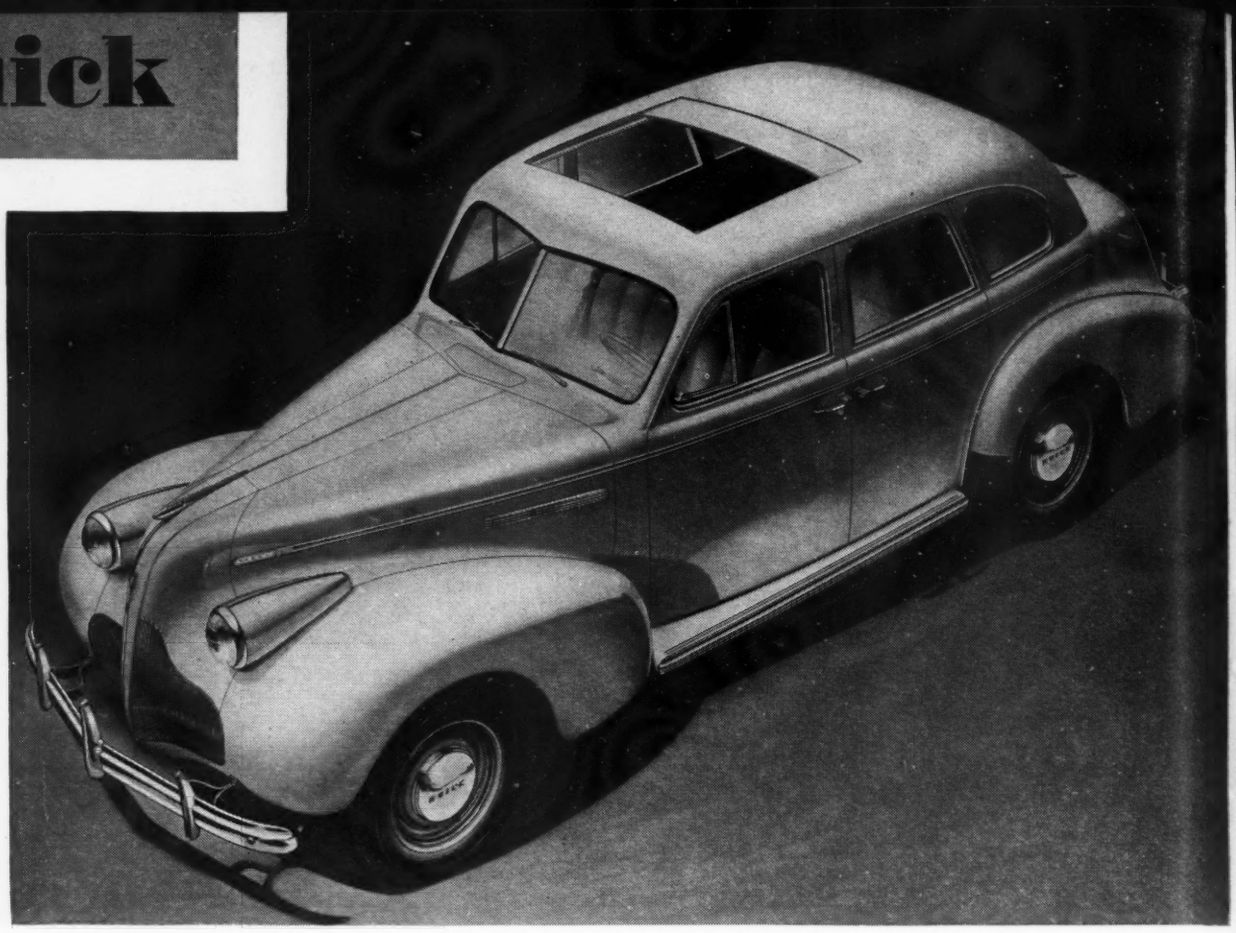
L. A. McGinnis of Wheeling, W. Va., says that the arrival of MOTOR AGE is the high light of the month. Mac continues and says that Tom Gluck deserved a lot of praise for his letter on motor fuel and wishes that more of the fellows would speak the truth. I'm with you there Mac.

Midnight Oil

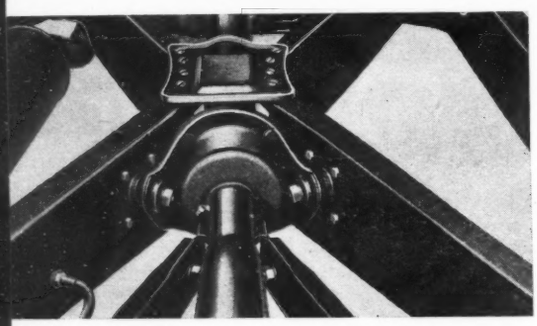
The fall season is certainly proving to be a tough one for me. In addition to all the new cars coming out, the 1939 Flat Rate Manual is going down the home stretch and the result is I have been buying the proverbial midnight oil in tank car lots. The Flat Rate is being completely revamped. Each of the 1939 cars will be on a page by itself, similar to the older cars. All the 1939 jobs will be grouped together and placed at the front of the book. We had to do it that way to avoid delaying the book. As usual it will be ready for distribution on Dec. 15. Among the new features that are being added are tractor tune-up data and Diesel engine service data. The book will be the best ever but I'll be mighty glad when the job is done.

Bill Toboldt

Buick



Models 41, 48 and 61 are available with the new Sun-Shine top.



Mounting of front end of torque tube, series 40 and 60. Torque ball is coated with rubber and universal joint is lubricated.

Simplified clutch. Only nine parts are needed in the '39 clutch assembly, whereas 41 were used in '38.

Rear axle and spring suspension showing frame ending at rear springs and new radius bar and channel strut rods.

Changes in torque tube drive and engine alignment -- new Sun-Shine top

FOR 1939, Buick offers four series of cars—the 40, 60, 80, and 90—with 18 body styles, distinguished by an entirely new appearance having long easy flowing external lines combined with unique front end styling featuring two die cast fender apron side grilles, without the former center grille.

Wheelbases are the same as before except on the Series 40, the latter being reduced by two inches to 120 in. All of the important chassis features introduced last year are continued but with improvements in practically every detail.

Frames for the Series 40 and 60 featuring box-section rails are completely redesigned, terminating just back of the rear axle centerline. With slight changes the body has been strengthened sufficiently to carry the gasoline tank, bumpers and whatever luggage may be carried in the trunk compartment.

Outstanding optional feature is Sun-Shine top equipment which will be available at the factory on the Series 40 two and four-door touring sedans, and on the Series 60 four-door touring sedan. A section of the top is made so that it can be slipped back leaving a portion of the interior of the car exposed to the sky.

While the engines remain substantially the same a number of changes have been incorporated. On both the 40 and 60, the new low bodies with the low frames necessitated a radical change in the torque tube drive and engine alignment. Engines in both chasses have mountings which tilt the principal axis 5½ degrees, lowering the flywheel housing to meet the torque tube. At the front, the engines are supported on two rubber-to-metal brackets, one on each side of the timing gear cover support. At the rear are two new supports, one on each side of the flywheel housing, anchored to a frame cross member. The transmission steady rest and brace formerly employed is continued on the 80 and 90 but discontinued on 40 and 60.

Simplified down-draft carburetors,

(Continued on page 64)

Hupmobile

Six cylinder, five passenger sedan on 115 in. wheelbase.

New low-priced Six to be followed by Four featured in ultra-modern body lines

IN addition to the Senior Six and Eight—which are continued with improvements, at reduced prices, in the Hupp line for 1939, a new, low-priced Six on a 115-inch wheelbase will be displayed at the New York and Chicago shows by the Hupp Motor Car Corp.

The 115-inch Six is powered with a 101-horsepower, 3½ in. x 4¼ in. L-head Hupp engine. The chassis, completely engineered by Hupp, is of the conventional rear-axle drive, although the body dies are those recently purchased by Hupp from Cord, which was front-axle drive. The ultra-modern body lines, entirely new in the low-price field, are expected to startle motorists accustomed to cars of such rakish design only in the costlier brackets. The same bodies will later be available on a chassis powered with a 4-cylinder engine, with emphasis on gasoline economy.

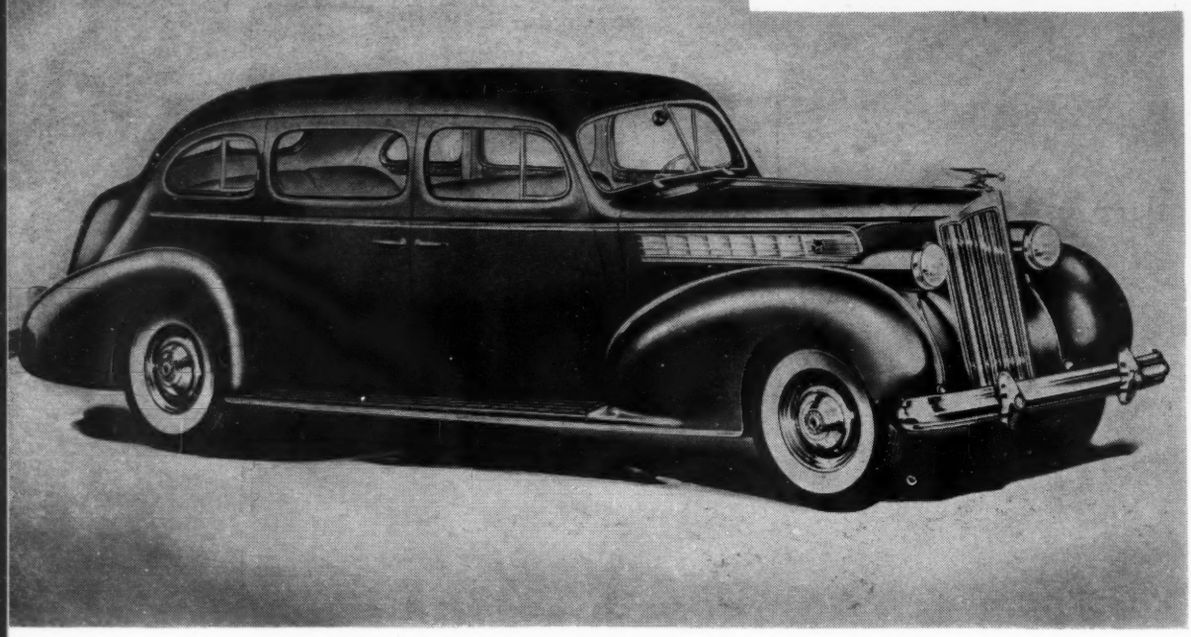
Both the Six and the Four will be available at first in two 5-passenger models equipped with sport and custom accessories, the custom equipment consisting of the addition of no-draft ventilation, banjo-type wheel, manual gear shift on the steering column, new type horn, clock and additional accessory group. Later a convertible sedan and convertible coupe will be offered on the Six chassis.

An etched metal dash provides a new arrangement of instruments and controls grouped around the radio grille. The V-type windshield adds to the dashing appearance of the body and provides excellent visibility. Two windshield wipers are standard. While the new, low-priced Hupp Six is ten inches shorter in wheelbase than the Cord, no interior room has been sacrificed. Those familiar with the roominess of the high-priced Cords know that perfect comfort is provided for five passengers. A commodious luggage compartment, which contains the spare wheel, is located under the sloping rear deck. Double sun visors and tail lamps are standard. The front seat, which is 53 inches wide, is adjustable forward and back and rises as it is moved forward. Rear doors open outward against the wind stream.

Both six and eight-cylinder engines are of the L-head, in-line type. Cylinder block and crankcase are of heat-treated chrome-nickel alloy iron castings, sealed by a special process to insure freedom from grit and dirt. Crankshafts are forged and machined for both static and dynamic balance, reducing engine vibration to a minimum. Cylinder heads have a domed, high-compression type of combustion chamber. Cylinder walls are honed by Hupp's exclusive "anti-distortion head" process. Aluminum alloy pistons with Invar struts are used. The eight-cylinder engines have dual carburization and dual manifolding. In both sixes and eights, carburization has been improved from the standpoint of acceleration and fuel economy. The cars are equipped with the latest type of Carter carburetor especially adapted to Hupp. Combustion is evenly regulated by vacuum spark control. Both power plants are mounted at four points in rubber-shear type

(*Continued on page* **66**)

Packard



The new super eight four-door sedan

By
JOSEPH GESCHELIN

Packard introduces Super Eight series—an entirely new car. Remote control shift standard on Six, Eight and Super Eight. Power shift standard on the Twelve.

A BRILLIANT new Super Eight series, intended to be priced lower than ever before, leads the Packard line for 1939 which comprises the Six, the Eight (formerly 120), the Super Eight, and Twelve. As in past years, Packard styling retains its characteristic pattern with only slight modifications in detail.

The 3½ x 4¼ in. Six is mounted on 122 in. wheelbase, the 3¼ x 4¼ in. Eight and 3 3/16 x 5 in. Super Eight on 127 in. wheelbase, the Twelve on 134-⅜ in. wheelbase. These are the basic chasses for five-passenger sedan bodies.

The Super Eight is an entirely new car, mounted on the Eight chassis and featuring many of the Junior line units and improvements, including the Junior line body shell. It will, however, embody the Super Eight engine with refinements. In addition, the interior trim, hardware, accessories, etc., will be in keeping with Super Eight tradition.

Packard Six, Eight and Super Eight embody many advanced engineering features including—remote control transmission shifting as standard equipment, a new suspension system comprising important changes both at the front and at the rear; a new transmission designed for remote control; and the new solenoid-controlled overdrive transmission as optional equipment. The Twelve is continued without change save for some important details. Evans power transmission shift is standard on the Twelve.

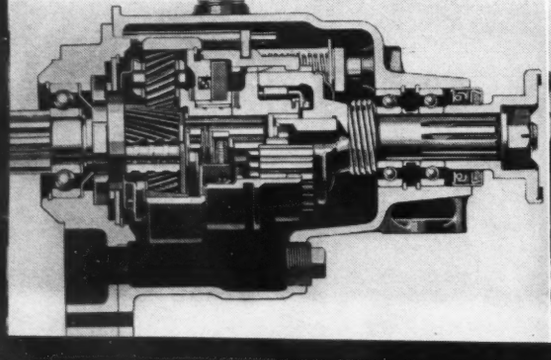
Physically the engines in every series remain the same with some changes. Both the Six and Eight have new malleable iron camshaft, Tocco-Hardened. These engines also are equipped with a new Morse timing chain having a special link design which prevents sagging between sprockets, eliminating all tendency to whip, sag, or rattle.

New connecting rod bearings of full cylindrical form, babbitted, are used on the Six, Eight, and Super Eight.

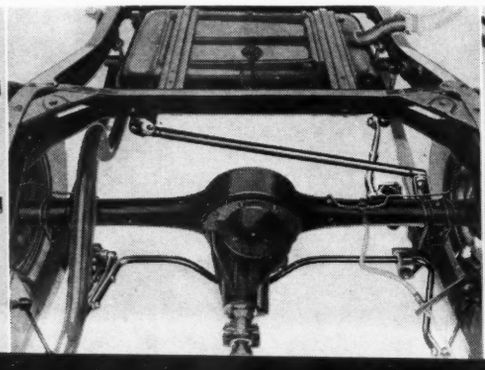
Biggest talking point on the Six, Eight and Super Eight is the new

(*Continued on page* 38)

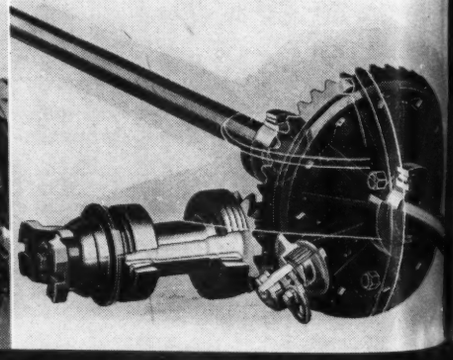
Cross section of Packard overdrive. Note preloaded bearing in rear bearing retainer.



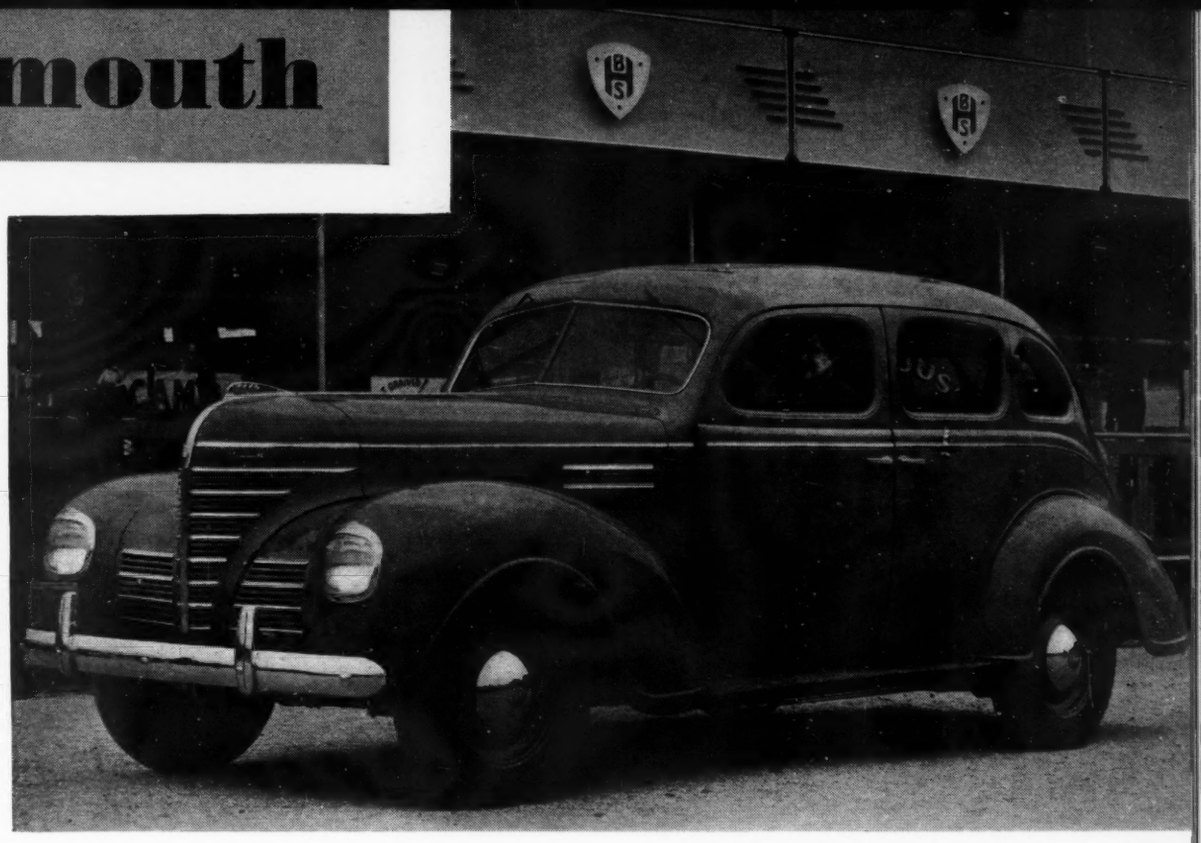
Note rear sway bar and shock absorber linkage as used on six, eight and super eight Packards.



A special roller bearing cage retainer to limit deflection of ring gear to .005 in. is a Super Eight feature.



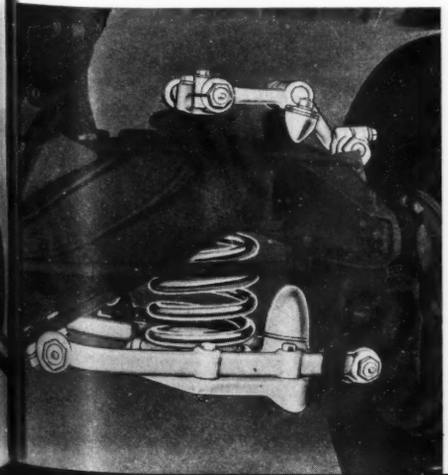
Plymouth



To improve riding qualities and increase comfort, wheelbase has been increased to 114 in.

Gear shifting is now accomplished by means of a lever under the steering wheel.

Front suspension of the wishbone type is now standard on the 1939 Plymouth



Independent front end suspension of the coil spring type and wheelbase increases feature Plymouth for 1939.

TAKING up the mechanical improvements in detail, we find that the frame of the 1939 model has 6-in. side rails with 1½-in. flanges, which together with a new center X member 10 in. deep have increased the frame rigidity 25 per cent. Engine supports at both front and rear have been stiffened.

Independent suspension on coil springs of Amola steel is used at the front of the chassis, the steering heads being guided by a wishbone linkage. Each spring is wound from a steel rod 11 ft. long. Power-plant improvements include a new type of piston ring with specially treated surface which is said to reduce the wearing-in time. Both of the compression rings are of this type, and the top ring is said to have 25 per cent more bearing surface and correspondingly less specific pressure. Exhaust valves are of a new silicon-chromium steel. The carburetor now has 10 per cent more flow capacity and is provided with a balancing tube, the float bowl being vented into the air cleaner, which prevents changes in the mixture ratio when the air cleaner becomes clogged. The inverted fuel pump gives greater protection against vapor lock.

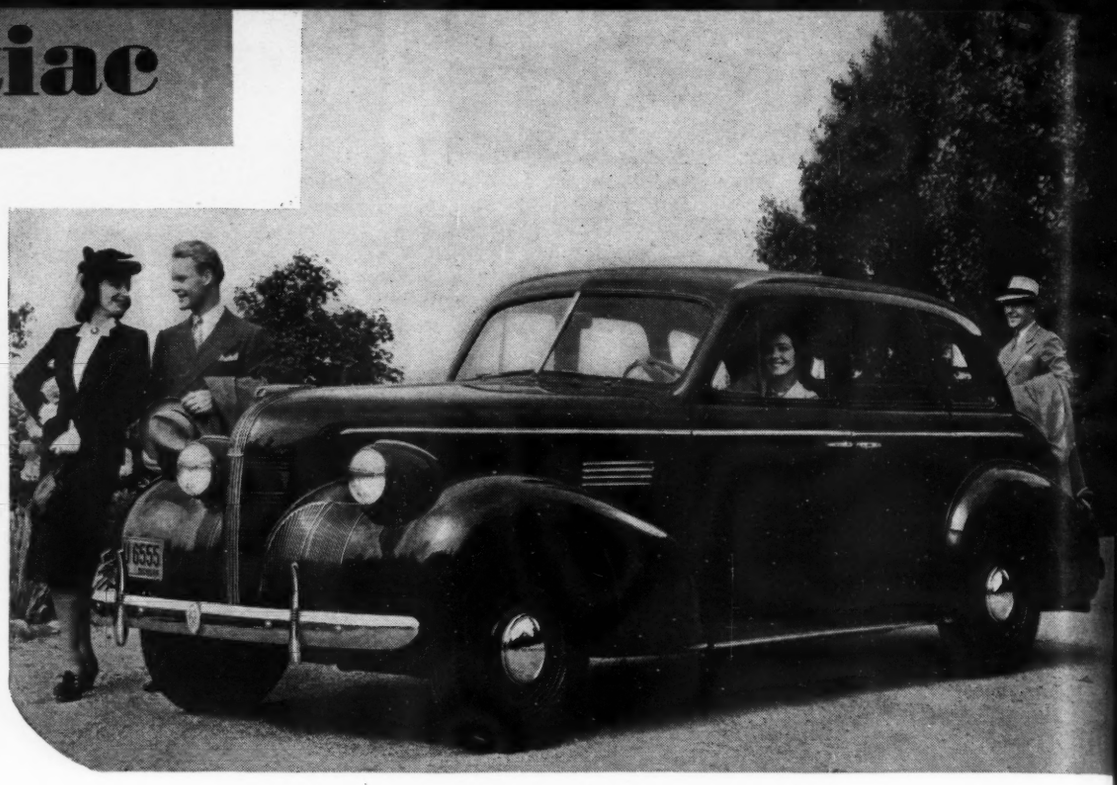
With the new independent front suspension, center steering is used, and the conventional drag link is eliminated. The steering gear ratio has been brought back to its former high ratio of 18.2, to facilitate maneuvering in parking. A new all-silent transmission is standard on the 1939 Plymouth. All gears are of case-hardened Amola steel and are automatically synchronized. Through the use of an "over-center" spring and variable pedal ratio, the pressure required to operate the clutch has been decreased. Clutch ventilation has been improved by increasing the size of the ventilation openings, and the clutch housing has been stiffened by ribbing.

Wheel-cylinder connections of the hydraulic brakes have been simplified, and the flexible tubing at the wheels has been shortened to reduce the pedal travel required. A new brake-lining material with a friction coefficient 10 per cent higher reduces the pedal pressure required to apply the brakes.

The Plymouth for 1939 retains those features that have long been characteristic of this make, including floating power engine mounting, low-pressure shock absorbers, rubber body mountings and sound-proofing. A new

(*Continued on page* 70)

Pontiac



De Luxe Six, four-door sedan. Running boards are optional.

BY
JOSEPH GESCHELIN

Hypoid rear and remote control shift standard on all models. New simplified clutch

PONTIAC'S program for the 1939 market comprises three new cars —the DeLuxe Eight on a 120 in. wheelbase, the DeLuxe Six on a 120 in. wheelbase, three inches longer than last year, and the brand new Quality Six on 115 in. wheelbase.

DeLuxe Sixes and Eights are mounted on the same new low chassis frame and use the same Unisteel Fisher body, available in five body styles. These cars will be offered with or without running boards depending upon the buyer's preference. The Quality Six is an entirely new car with a different chassis and slightly smaller body, also available in five body styles.

The new bodies emphasize the modern streamline trend developed by Fisher, incorporating larger window areas, slender pillars, all contributing to better visability.

Briefly high-spotting the outstanding features of the '39 Pontiacs, it may be noted that the 3 7/16 x 4 in., six and 3¼ x 3¾ in. eight-cylinder engines are continued unchanged but with many improvements, the same six cylinder engine being used for both the DeLuxe and Quality Six. Important feature is a new and simplified clutch having a one-piece cone-shaped spring which eliminates most of the parts associated with conventional clutches.

Last year, Pontiac pioneered remote transmission shifting as an optional feature. This year, the Servo Safety Shift so-called, becomes standard equipment on all models in combination with a new and improved transmission designed specifically for remote control.

Claimed as an exclusive feature is the first production use of variable rate rear leaf springs, featuring a unique helper spring section which accomodates the low spring rate to all conditions of loading. This, in combination with a new propeller shaft drive, and inclinably mounted direct acting shock absorbers produces the best ride ever offered in Pontiac cars.

A hypoid rear axle now is standard on all models.

Six cylinder engine incorporate some important changes which may be noted briefly as follows—all crankshaft main and rod bearings upped ⅛ in. in diameter, necessitating the use of new bearings, thicker bearing caps and new connecting rods.

Due to the use of alligator hoods with stationary hood panels, the Gas-elector has been rendered more convenient for service adjustments by arranging the timing pointer directly above the distributor.

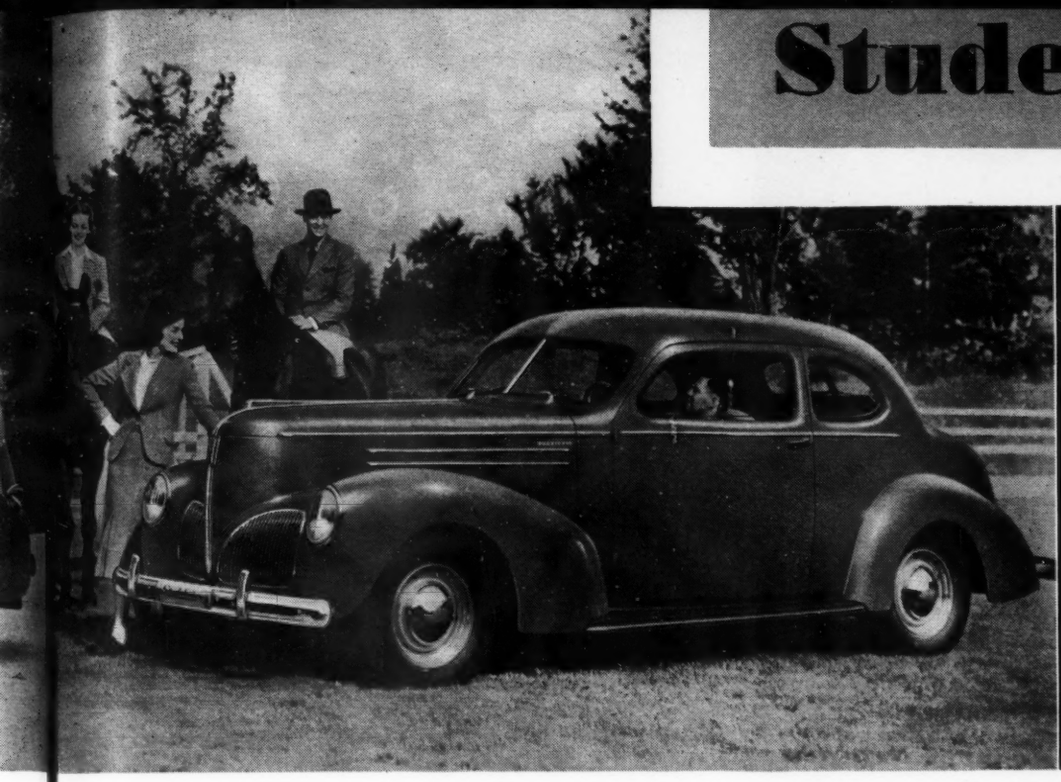
A new and simplified Carter carburetor is used. This is a down draft, triple venturi unit with fewer parts than before. The float chamber now is baffled so that the fuel level is not affected by fast cornering. Another refinement is the addition of a small passage in the main fuel nozzle which admits air to the fuel stream. A throttle controlled, positively operated fuel economizer replaces the vacuum type formerly used. Accelerator pump and economizer linkage are enclosed in a sealed die cast housing.

The new single plate clutch with a one-piece Bellville washer type cone spring is standard on all models. This spring member replaces a total of 21 parts conventionally used. It incorporates 18 integral release fingers making better distribution of pressure.

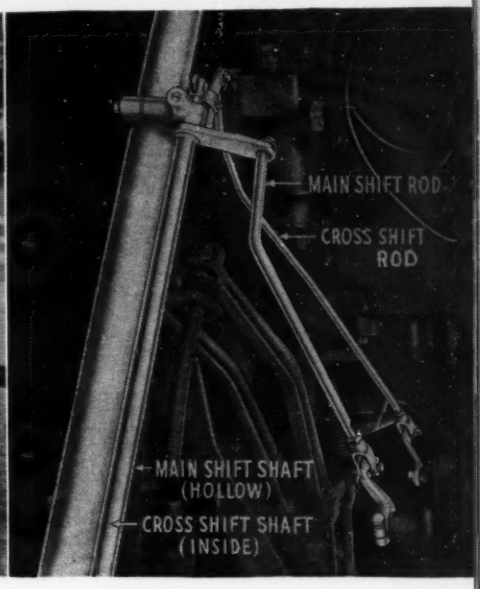
Manifolds have been changed to save weight. The exhaust manifold now is a single casting instead of the two-piece formerly used. The intake

(Continued on page 36)

Studebaker



State President club sedan for 1939



New type overdrive optional—new transmission—optional ventilation control

A COMMANDER, on 116.5 in. wheelbase, and a State President, on 122 in. wheelbase are Studebaker offerings for the 1939 market. Each line will include the following body styles—four-door sedan, club sedan, coupe, and convertible. Both models are distinguished by a new treatment of front end styling without center grille but with two die cast side grilles of large area mounted in the front fender aprons.

Mechanically, the new Studebakers offer four major features—a new type of overdrive, optional on both models, with special solenoid control making the unit responsive to the driver's will; the Climatizer—an optional feature providing fresh air heating, complete air filtering, and ventilation with the circulation of 250 cu. ft. of filtered air per minute; remote control of gear shifting in combination with a new transmission.

The improved engines remain unchanged in major detail. Engine for the State Commander is 6-cyl., L-head, 3 5/16 in. bore by 4⅜ in. stroke, 226 cu. in. displacement, rated 90 hp. at 3400 r.p.m., with cast iron head, 6 to 1 compression ratio.

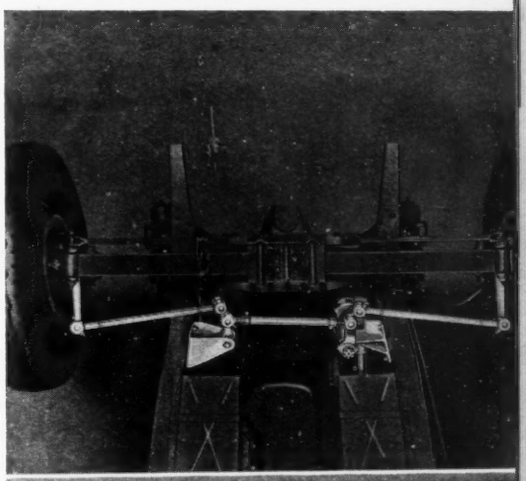
President engine is 8-cyl., L-head, 3 1/16 in. bore by 4¼ in. stroke, 250 cu. in. displacement, rated 110 hp. at 3600 r.p.m., with cast iron head, 6 to 1 compression ratio. Fram oil filter is carried standard on both engines.

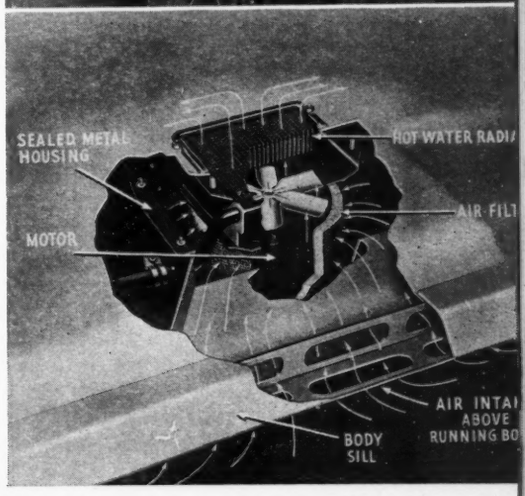
The rear axle is unchanged, the same unit of 4.55 to 1 ratio being standard on both models. Spicer universal joints and Houde shock absorbers are standard with thermostatic control for the rear. The Ross steering gear and steering linkage remain the same so far as geometry goes but the linkage has been altered in detail by the substitution of metal joints.

The Planar independent front wheel suspension, an exclusive feature, has been further improved and simplified in detail. Drop forgings have been redesigned and the Houde shock absorber is made an integral part of the suspension mounting on President models. The leaf spring for President models has been increased by 1½ in., and is now 49½ in. in length, with 15 leaves.

A new transmission designed exclusively for remote control shifting is employed. The double-blocker synchronizer used in shifts to second or high has been improved, making shift-

(Continued on page 40)





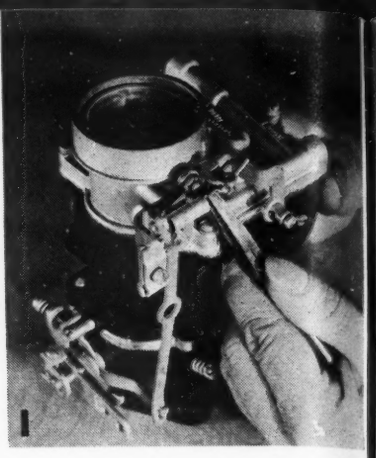
(Top) Remote control shift linkage

(Center) Both front wheels get the same "attention" from this steering hook-up. Arms are of equal length, insuring positive control.

(Lower) New heating, air filtering and conditioning unit.

By ***BOB TURNER***

1—Remove choker return spring.
2—Remove throttle opening link.
3—Remove range adjusting needle.
4—Remove choker sleeve to body screw.
5—Remove bowl cover assembly.
6—Disconnect rod from pump plunger rod assembly.
7—Remove pump plunger rod assembly.
8—Remove vacuum step-up piston assembly.
9—Remove range adjusting needle spring.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Marvel Carburetor

Models C-2 and C-3

10—Remove pump outlet check valve assembly.
11—Remove pump discharge jet.
12—Remove pump housing screw.
13—Remove pump housing assembly.
14—Remove pump inlet check valve assembly.
15—Remove idle adjusting needle.
16—Remove body plug and clean passage.
17—Remove nozzle screw plug. Then remove metering pin housing screw. To remove power jet it is necessary to use a special wrench.
18—Remove carburetor body to throttle body screws and lift throttle body from main body.
19—Remove float lever shaft and float assembly.
20—Lift out small idle tube, and remove bowl cover gasket.
21—Remove idle air vent jet and clean.
22—Remove needle seat.
23—Remove bowl cover plug.
24—To check float level remove plug in side of bowl.

(Directly Below) Sectional views of carburetor.

GENERAL—Clean out all passages with acetone and air. Allow carburetor parts to soak in acetone until all gum, dirt or deposit from gasoline is dissolved. In reassembling carburetor reverse the above procedure. When assembling parts be sure to use new gaskets at every point requiring a gasket. Use screw drivers that fit the head of the screws being worked on.

The following tools for use in overhauling this carburetor are available and may be purchased from the Marvel-Schebler Carbureter Div., Borg-Warner Corp., Flint, Mich.:—float valve seat wrench, float lever bending tool, metering pin timing gage, main nozzle and power jet wrench, metering pin housing seating tool and range adjusting tool.

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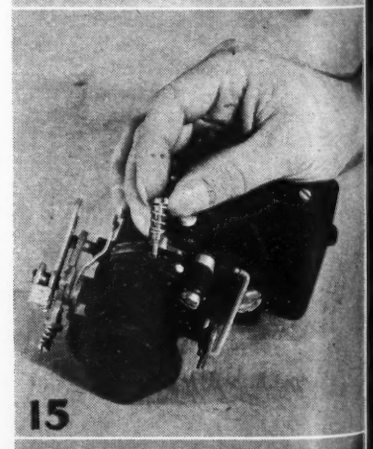
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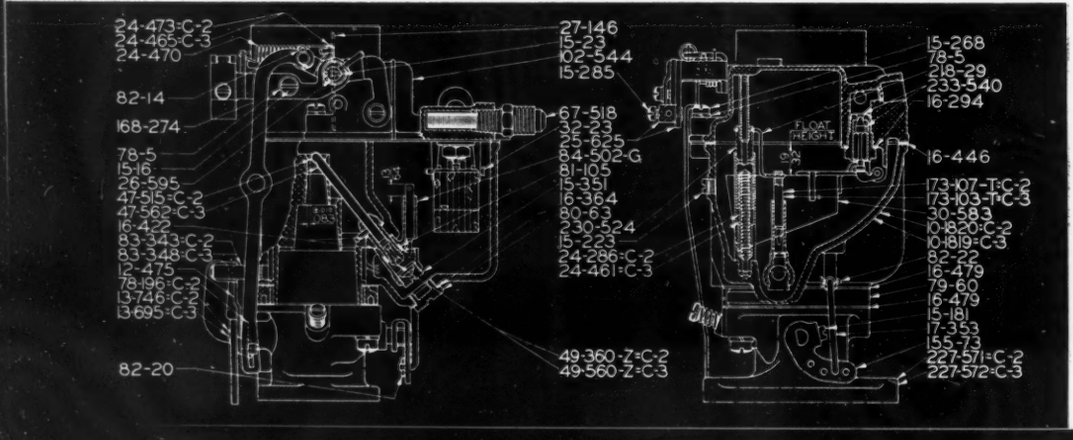

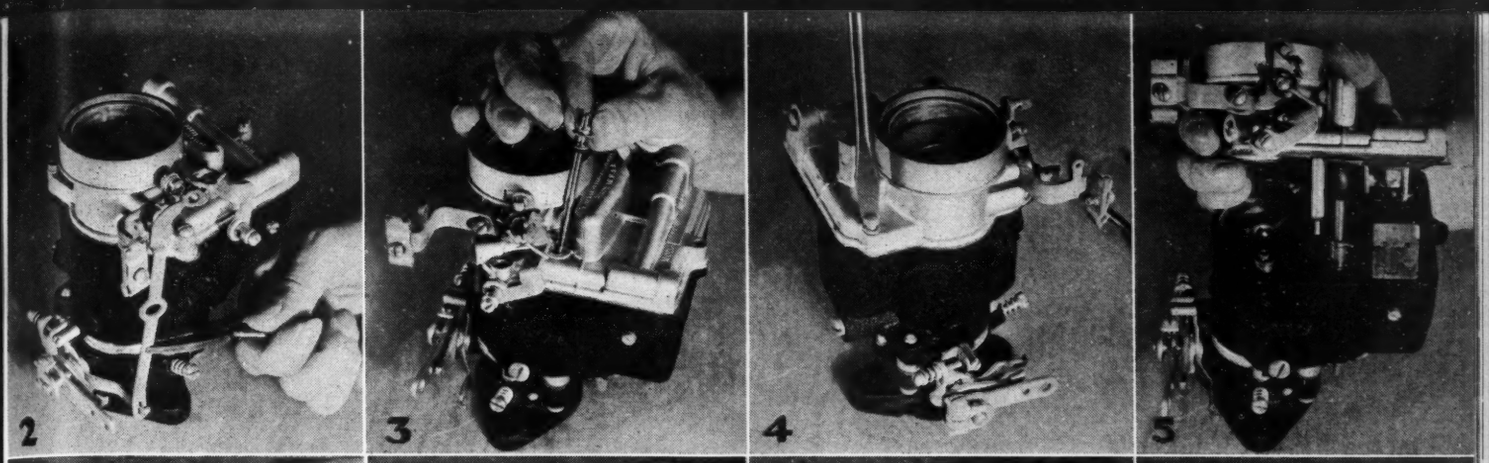
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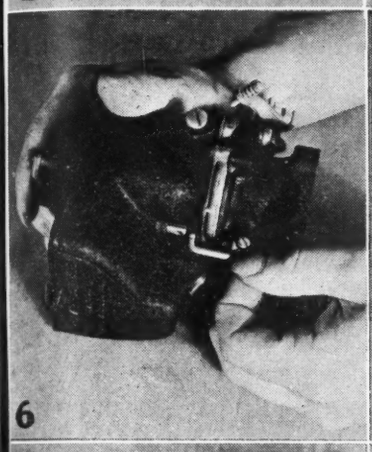
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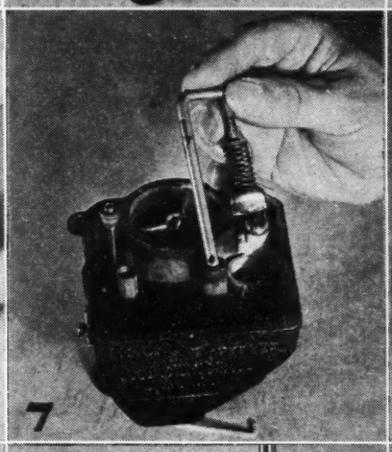
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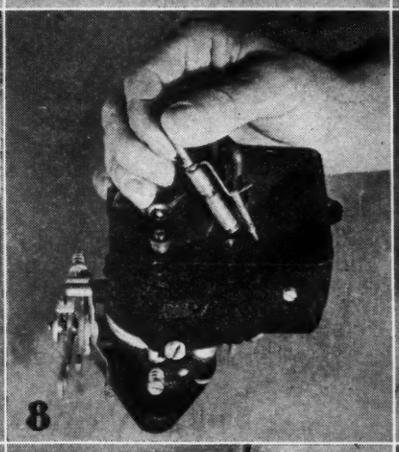
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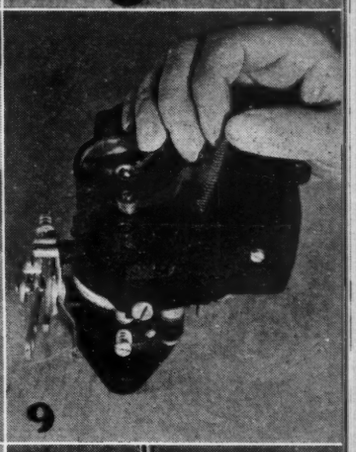
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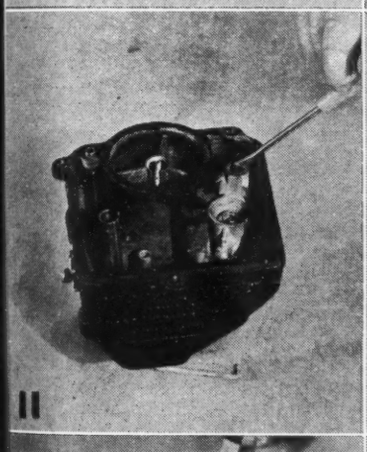
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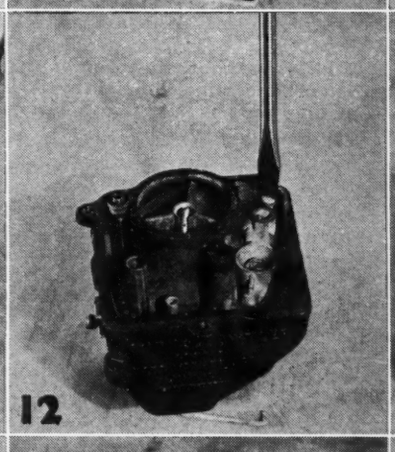
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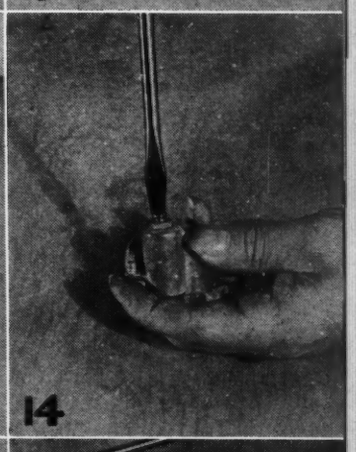
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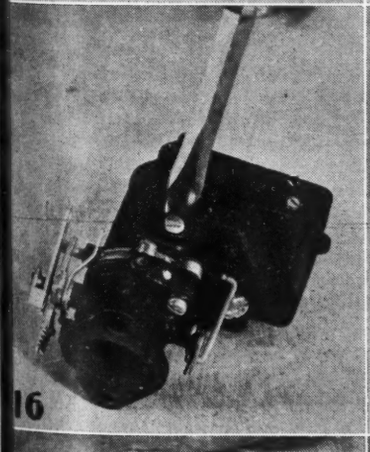
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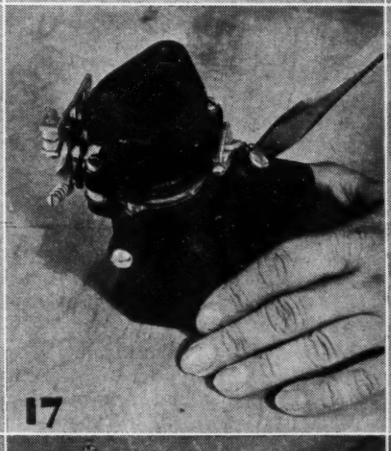
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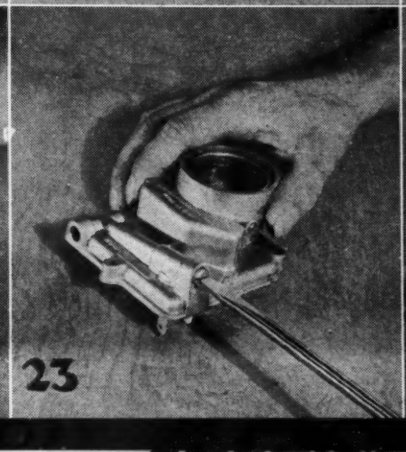
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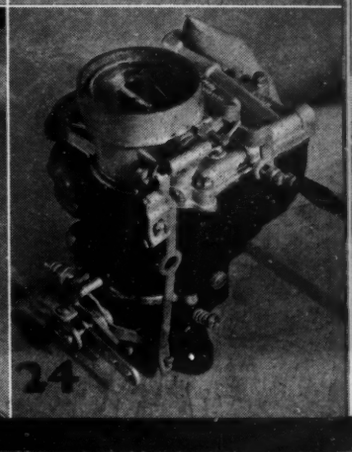
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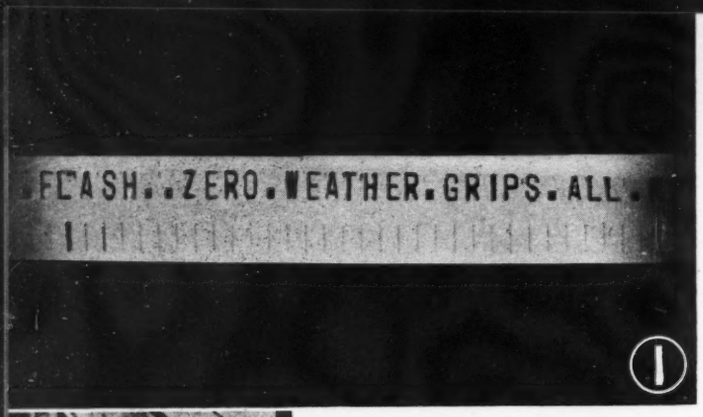
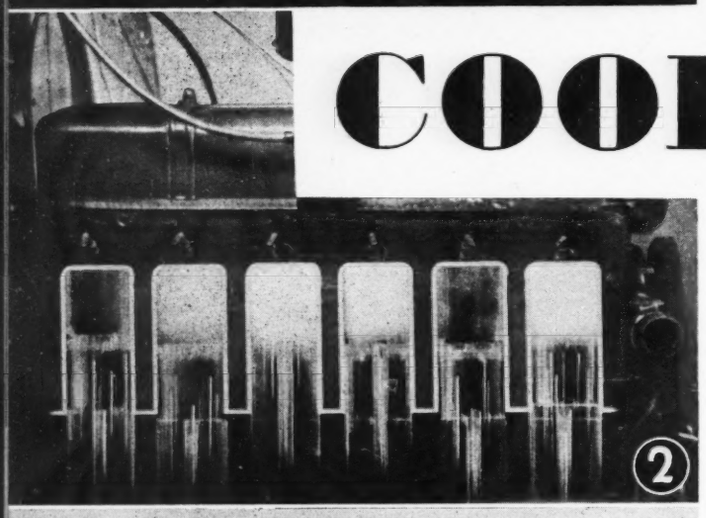
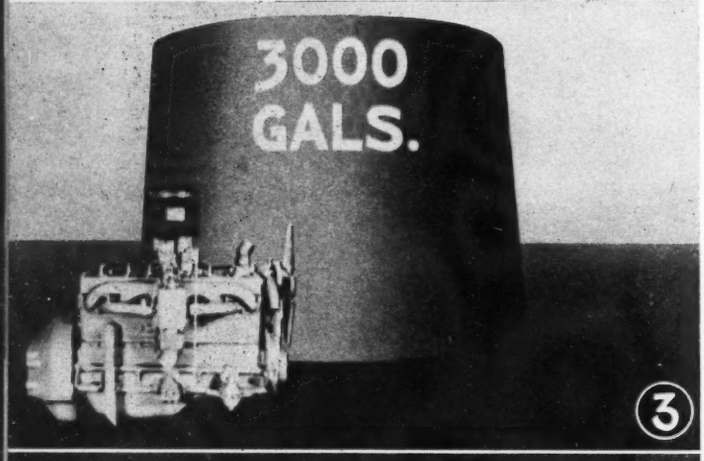


COOL HEADS



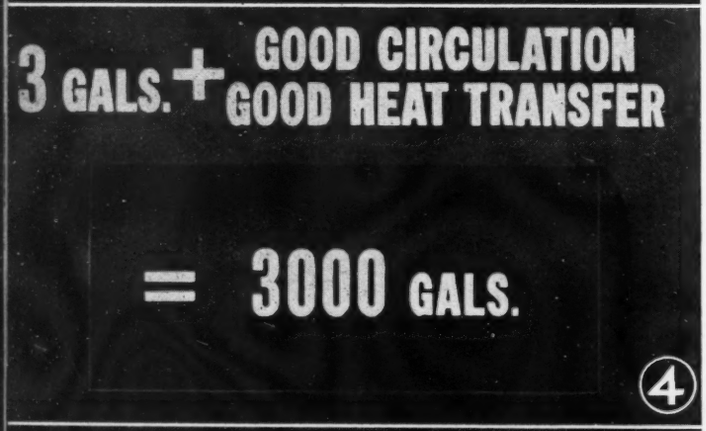
The illustrations and information on these pages were taken from the sound film "Cool Heads" prepared at the Du Pont Research Laboratories for the "Zerone" Division.



1. Like the poor, the problem of keeping the engine cooling system operating efficiently is always with us. And when weather reports such as this one are broadcast, the problem becomes more difficult.

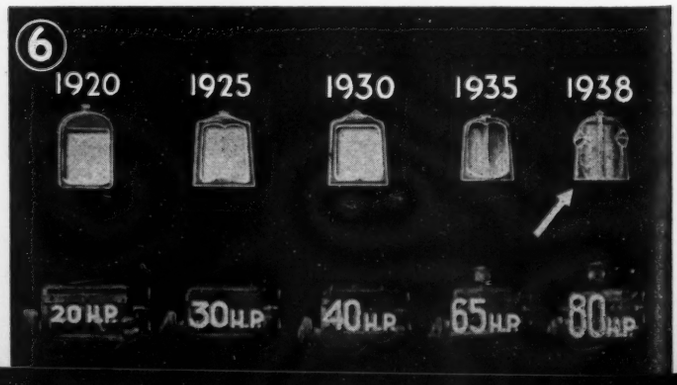
2. There is always a conflict between heat and cold—and nowhere is the conflict greater than in an automobile engine where enough heat is generated to heat a small theatre. That's a lot of heat, which if allowed to accumulate would have the engine looking like a wax candle on a summer's day.

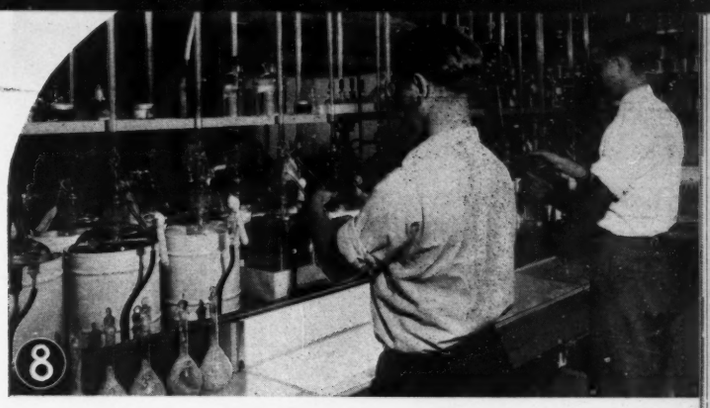
3. Just to keep the engine from melting itself, 3000 gallons of water are pumped around these fires every hour. At that rate it would only take one minute to completely fill a large barrel.



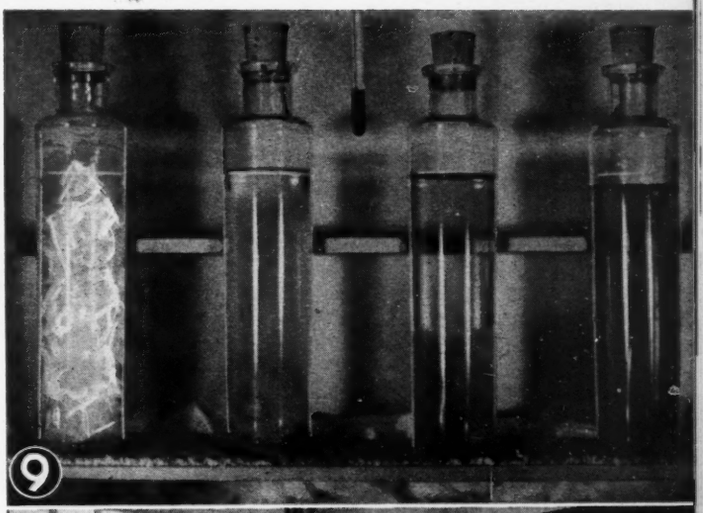
4. But 3000 gallons takes up a lot of space so the engineers make a few gallons do the work of many. Water appears to be the ideal liquid for cooling—it's cheap, flows freely and has the greatest ability to absorb heat—But the darn stuff freezes and causes metals to rust.

5. Rust not only reduces the flow of water through the radiator and water jackets, but also insulates them, making it still more difficult for the heat to pass into the water. When the radiator passages are only as thick as two thin dimes you can't afford to have much rust.





A Study in Anti-Freeze

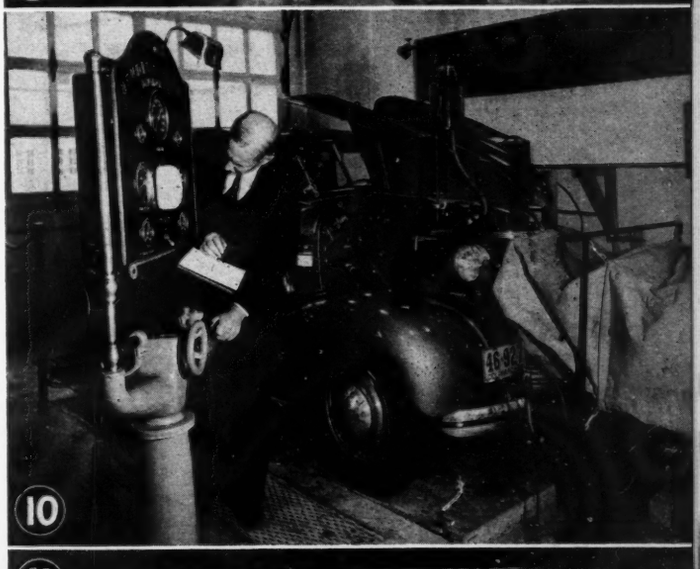


6. The fact that radiators haven't become larger as engines developed more power hasn't made the job of cooling any easier. Radiators today are more efficient, but operate with smaller margins of safety.

7. Cooling is just as big a problem in summer as in winter. In winter frozen blocks and radiators do not make for good engine performance. In summer an engine and radiator clogged with rust isn't much better.

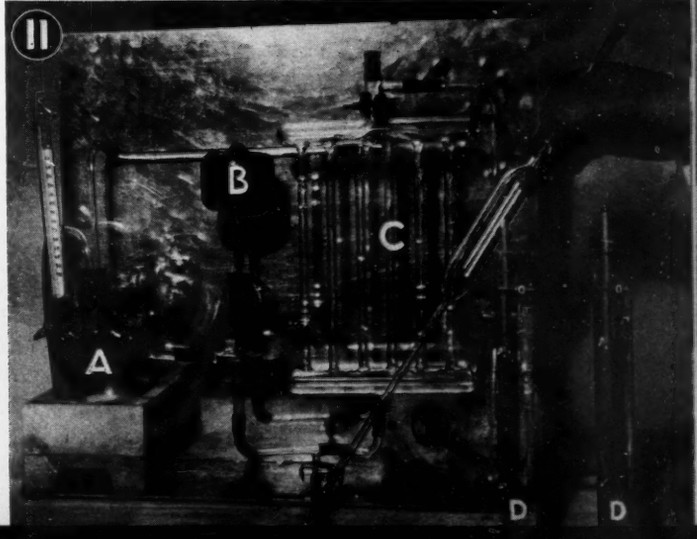
8. To meet and solve these problems countless hours have been spent in laboratories in extensive and scientific research by highly skilled chemists using intricate and expensive apparatus.

9. Here is one test made in the duPont laboratory. The bottle at the left contains water. The two in the center contain mixtures of water and Zerone. The one on the right holds a 100 per cent solution of Zerone. They were subjected to gradually lower temperatures, down to 100 deg. below zero. At 32 deg. the pure water froze and cracked the bottle. At lower temperatures, the two center bottles froze but did not crack. At 100 deg. below zero, the bottle containing pure Zerone had frozen, but the Zerone now occupied less space than formerly.



10. A good anti-freeze should reduce the amount of preignition when the engine is operated. The illustration shows Dr. Duus of the Zerone division of duPont testing an engine cooled with Zerone solution for preignition or "pinging."

11. In checking to see if the freezing point of the solution that comes out of the overflow of a radiator is the same as the freezing point of the solution in the water jacket, duPont engineers developed this laboratory type cooling system. Here, "A" is the engine, "B" the water pump, "C" the radiator and "D" the graduates for checking the freezing points of the solutions.



During the lifetime of J. H. Williams & Co., approximately $35,000,000 has been paid out in wages, and opportunity for better living has been provided for an increasing number of workers from 15, at the beginning, to a maximum of 1200.

Forgings and Free

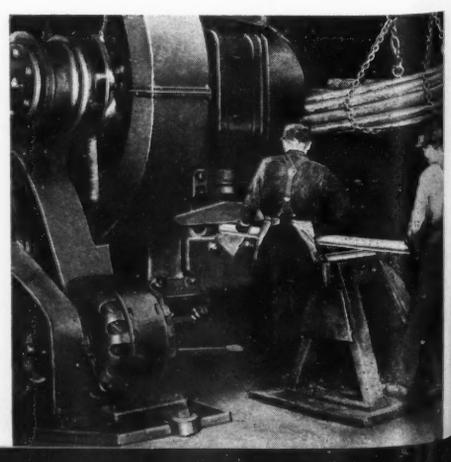
BY

JULIAN CHASE

The W and the diamond have been combined to form the Williams trademark since 1884. Originally, the business was known as Williams & Diamond and the trademark was devised from the names of the partners.

DURING comparatively recent years the development of automotive service work has, as we all know, tremendously increased the number of types and sizes of wrenches in everyday use. In the open-end group, to take just one example, we have almost countless variations from the original so-called "engineers' " wrenches which were the principal line of the few types available for many years. But, even today, in the catalogs of most, if not all, makers of the original type, the single head, open-end engineers' wrench for a hexagon nut on a half-inch U. S. Standard bolt will be found listed as No. 5. The reason? Well, when J. H. Williams & Co. brought out a catalog of its wrenches in 1887, listing its products according to size, the half-inch U. S. Standard was No. 5 in the list. The size numbers for engineers' wrenches in that catalog were later adopted, for the convenience of wrench buyers and sellers, as standard throughout the industry and trade.

Three years before that catalog



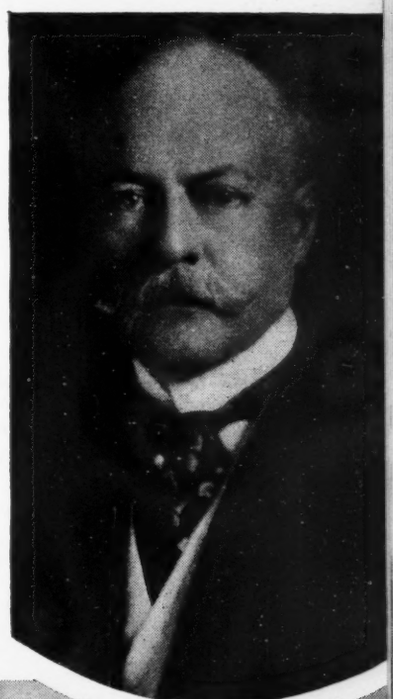
appeared, J. H. Williams & Co. came into being, succeeding the partnership of Williams & Diamond. The reorganized company's hopes and undertakings were set forth in its first advertising circular as follows: "We are now making a complete line of Lathe Dogs, Engineers' Wrenches and other wrenches, and we solicit orders for any wrought iron or steel articles, from a fraction of an ounce to thirty pounds in weight, which require to be duplicated in large quantities."

James Harvey Williams, who was the Williams of Williams & Diamond, had, from 1870 to 1881, been in business with his cousin, Eliphalet Williams Bliss, as Bliss & Williams, press and die manufacturers in Brooklyn, New York. Later, some time after Mr. Williams withdrew, the continuing firm was changed to E. W. Bliss Co.

For twenty years James H. Williams headed and directed J. H. Williams & Co. Today, and for the past twenty-two years, the company has been headed and directed by J. Harvey Williams, son of the founder, who became vice-president in 1904, the year his father died, and president in 1916. In his business philosophy, his economic thinking and his attitude toward the human element in industry, Mr. Williams, the son, is strikingly like and fittingly comparable with Mr. Williams, the father. He is, furthermore, broadly interested and active in industrial and economic matters generally. That interest has been manifested by major participation in the conduct of such organizations as the Brooklyn Chamber of Commerce (President, 1921-22); American Drop Forging Institute (President, 1922); American Supply & Machinery Manufacturers Association (President, 1934-35); N. Y. State Economic Council (Director, 1929-38).

(Continued on page 58)

J. Harvey Williams (at left) has headed and directed J. H. Williams & Co. for 22 years. His father, the founder of the business (below, right) was truly a pioneering leader in American industrialism who, followed by a like-thinking, like-acting son, has contributed outstandingly and continuingly to the record of incomparable, altruistic achievement which characterizes the American System of Free Enterprise.

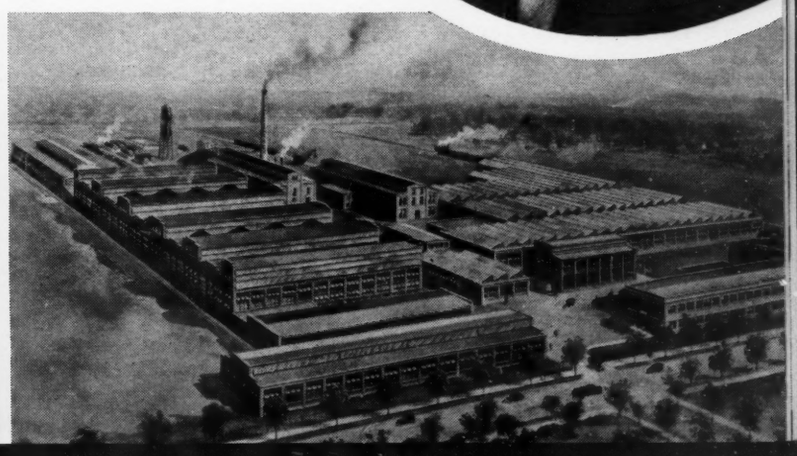


Enterprise

How Williams initiative and ambition created increasing opportunity and better living for others under the American system

The size numbers and dimensions of open-end "engineers'" wrenches in the table below appeared in a Williams catalog issued in 1887. Size numbers in that catalog were later adopted as standard throughout the industry and trade. At right, below, is a view of the present plant of J. H. Williams & Co. in Buffalo.

Number.	Size Bolt, U. S. Standard Nut.	Opening Unfinished.	Opening Finished.	Extreme Length.	Thickness Head.	Price, Unfinished.	Price, Finished.
0	3-16	5/16	13/32	2 7/8	7/32	$0.09	$0.18
1	1-4	13/32	1/2	3 3/8	1/4	.10	.20
2	5-16	1/2	19/32	4 3/8	9/32	.12	.24
3	3-8	19/32	11/16	5 3/8	5/16	.14	.28
4	7-16	11/16	25/32	6 1/4	11/32	.17	.34
5	1-2	25/32	7/8	7 1/4	3/8	.20	.40
6	9-16	7/8	32/32	8 3/8	7/16	.25	.50
7	5-8	31/32	1 1/16	9 1/2	31/64	.32	.64
8	3-4	1 5/32	1 1/4	11 1/4	9/16	.40	.80
9	7-8	1 11/32	1 7/16	13	37/64	.50	1.00
10	1	1 27/32	1 5/8	14 7/8	21/32	.65	1.30
11	1 1-8	1 15/32	1 13/16	16 3/4	47/64	.85	1.70
12	1 1-4	1 31/32	2	18 1/2	13/16	1.10	2.20
13	1 3-8	2 3/8	2 3/16	20 1/4	53/64	1.40	2.80
14	1 1-2	2 25/32	2 3/8	22 1/4	1 1/16	1.75	3.50



"Line-Up

1. Henry Damman, right, vice-president of the Bear company, and W. C. Goldschmidt, advertising manager, talk over the dial gauges of the Bear brake tester.

2. A couple of speedway veterans, Wilbur Shaw and Bill Cummings, look over the Bear dynamic wheel balancer used this year at Indianapolis for balancing race car wheels.

3. Will Damman, right, president of the Bear Mfg. Co., pointing out features of the alignment tester to Chester Ragland, of the Van Auken-Ragland Advertising Agency in Chicago.

4. Old timers will recall the "Sanbo" starter on this Ford exhibited at the San Francisco Fair in 1916. Henry Ford and Thomas Edison are shown in the background.

5. The Bear brake tester on this testing lane alongside the Bear plant at Rock Island is capable of handling the largest truck-trailer combination.

IT'S a far cry from the old Sanbo starter for Model T Fords to wheel aligning, axle and frame straightening and, more recently, dynamic wheel balancing. Hardly a connection, anyone would say, of course. Yet that is the story which has as its setting the enterprising city of Rock Island, Illinois.

But many may wonder at this point about the Sanbo starter. The old-timers, all, will surely recall it. It all began many years ago—along about the time the great World War got under way. It wasn't the best of outdoor sports for folks in those days to get out and crank up the famous Model T.

Naturally, when the Model T engine stalled, there was nothing to do but get out and twist 'er over. In those days muddy roads and so on often made the job anything but a pleasure. If only there was a way to crank the engine from the seat! And there came a way.

We must now shift the scene to the Dakotas. In the early Model T days there was a Ford dealer up in South Dakota that was doing a good job, and who liked to be just a little ahead of the parade when it came to doing things for his customers. This dealer had a service manager who besides knowing his job very well, also was a mechanical genius. His name was Sanbo.

He figured that if by some manner a helical tube could be put on the front end of the Model T engine and a cable run through it, a yank or two on the cable would flop the engine over at a good pace. A spring could reverse the mechanism allowing the cable to again feed into the helical-shaped tube. A ratchet could be made to allow a one-way pull. And so, the Sanbo starter came into its own. Old-timers remember it. A handle on the dash, a cable to the front of the car and running through a pulley to the starter mounted in the hole where the crank went.

And there were a lot of these starters sold. It was decided that they would be made in Rock Island, and a modest place was set up for their manufacture. There were a

(Continued on page 60)

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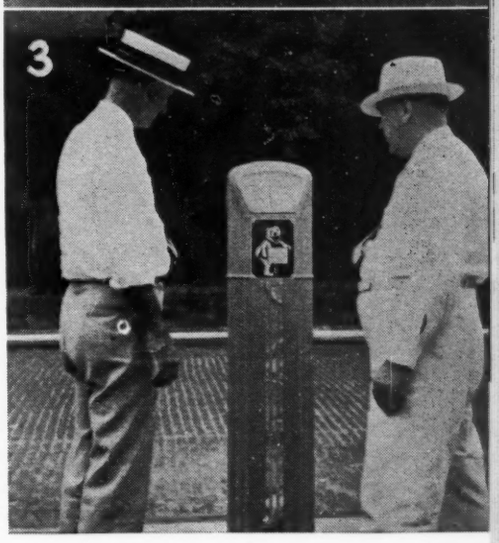
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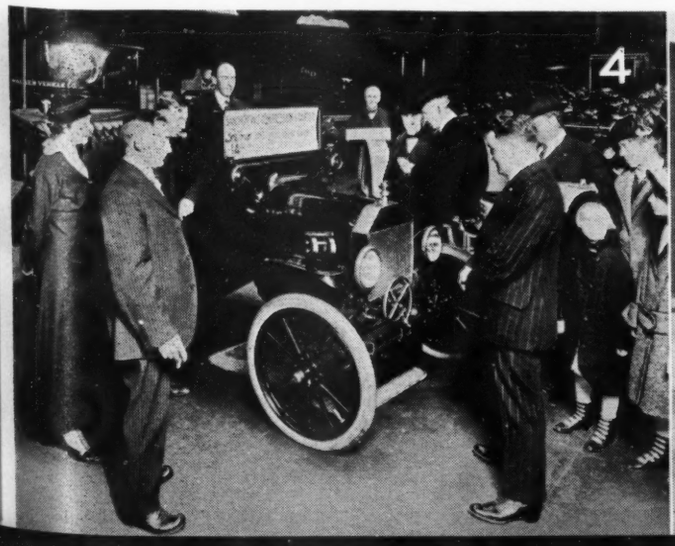
to Stop "Shimmy"

—might well be the motto of the Bear Manufacturing Co. whose products are familiar from Coast to Coast.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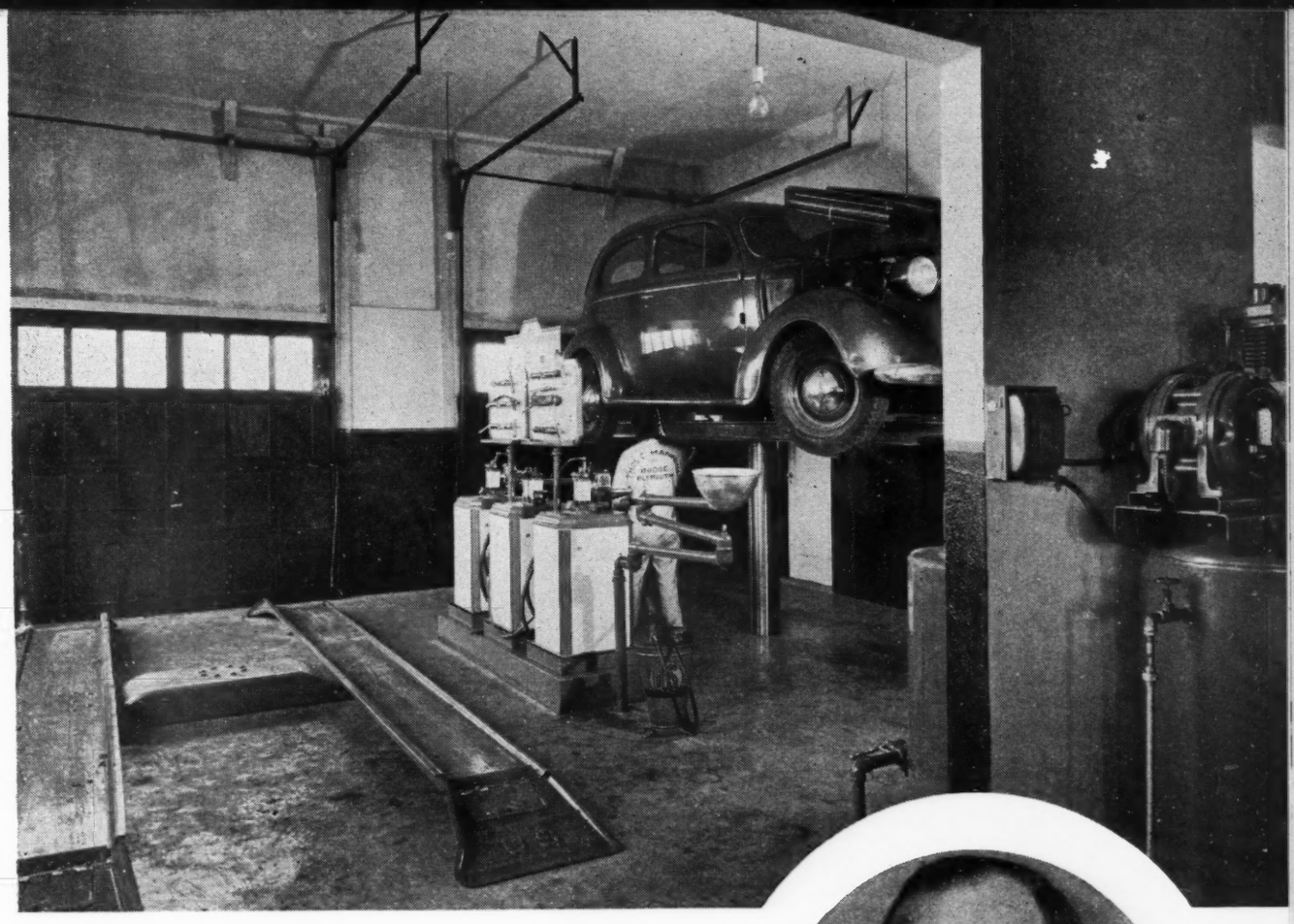
"Boy! Oh boy! What blow-by!"



THE READERS' CLEARING HOUSE

of

Service Men's Queries

24-Hour Service

We are located in such a way that it is almost impossible to increase our gasoline gallonage as the drive-in is too small and the women especially are afraid of it. We have a number of customers who patronize our shop but buy gasoline at other places because of the drive.

As there is no other place in town available for a larger drive at present, and as you know, your shop business is limited to the number of people you contact especially through gasoline service—here is my question.

Do you think it would pay to run a 24-hour service to handle any job at any hour?

There is no other shop in town at present that offers this service and while it wouldn't bring more people in for gasoline, perhaps the convenience might be a big drawing card. Of course, this would cause some of our present-day business to be shifted to night work.

The town has about 5000 population, mostly commuters.

Have you heard of anyone who has this same problem and has helped themselves this way, or is there any way you might be able to get any information regarding it? We know, of course, it would take about six months' actual experience to find out ourselves. We thought you might be able to give us some information regarding it. A New York Subscriber.

YOUR question is a pretty tough one. If your town was a plain, rural town I would definitely say

(*Continued on next page*)

BILL TOBOLDT, Editor of MOTOR AGE, conducts the Readers' Clearing House. He presents some of the thousands of questions asked by readers of MOTOR AGE together with a practical analysis of the difficulties in his replies. You, too, are cordially invited to send us your problems.

that you didn't have a chance. However, since it is a commuters' town. I would think that there is a chance that all-night service would pay. The reason for this is that most commuters do a lot of entertaining and there is always the chance that some of their guests will not be able to get their cars started.

I think that I would be inclined to take a chance and put one man on at night for a period of several months to see how it works out. At the same time, I would write to every one of the people in town and the surrounding trading area and let them know that you are providing all-night service not only for gasoline and oil but also for tire changing and complete repairs.

Unfortunately, I do not know of any shop similarly located that has tried all-night service.

As a compromise to the all-night service you might try service up to say two o'clock in the morning. It wouldn't be as expensive and if you find that pays, you could extend it to all-night service. But one thing you will have to do and that is to let the people know that you are open and you have to keep telling them and re-telling them the same thing.

Chokes and Dies

Please answer the following question. I am having considerable trouble trying to locate what causes a Ford V-8 1936 to choke up when trying to make a grade under ten miles per hour. Sometimes it dies down altogether when you step on the gas. Above this speed, the car is O. K. New set of spark plugs have been applied, the carburetor taken apart and cleaned, the distributor also removed and cleaned without any results. The car has only 20,000 miles. Let me know the correct method how to set the float in the carburetor and if there is any gage to be used to see the fuel level without taking the cover off. Montana Subscriber.

THERE is no sight hole in the carburetor float bowl which will enable you to determine the level of the fuel on the 1936 Ford. On that model carburetor it is necessary to remove the cover over the float chamber and then measure the height of the fuel from the top of the chamber. The correct height is 15/32 in. and many mechanics are setting this at 7/16 in., which will, in general, improve idling conditions. To adjust the fuel level it is necessary to bend the arm of the float so as to obtain the correct fuel height.

From the description you have given of your trouble, I am inclined to believe that your float level is too high and there is also a possibility that your needle valve is defective and that your fuel pump is developing excessive pressure. I would recommend rebuilding your fuel pump, the installation of a new needle valve and seat, and careful adjustment of the fuel level to 7/16 in.

Clearance spark plug setting on this job is .025 in. However, you might try it up to .030 in., which should assist in overcoming the choking up you are experiencing.

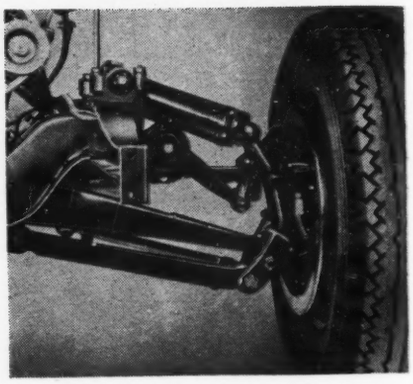
I would also recommend a careful check of your vacuum advance as it might be giving you too much advance at low speeds, which would also account for your trouble.

Parts Replacement Needed

I have in my shop a Studebaker 1935 Dictator, planer suspension front end. This car wanders or weaves at speeds above 30 m.p.h. After checking, I find the following—Suspension unit and all front end tight enough; steering gear O. K.; toe-in O. K.; axle caster right—½ deg.; axle caster left—3½ deg.; wheels fairly well balanced.

The tires were properly inflated and the rear springs tight on axle and ends.

I am at a loss to know how to change the caster and would appreciate any information. J. B. Scott, Buckhannon, W. Va.



IT is impossible to adjust caster on the Studebaker with a planer suspension. Caster on that car is determined by the relation of the front spring to the frame. Evidently one of your suspension members has become bent and will have to be replaced. In this connection, I suggest that you carefully check the steering knuckle support arm on both sides of the car and also the front cross-member in which the spring is mounted.

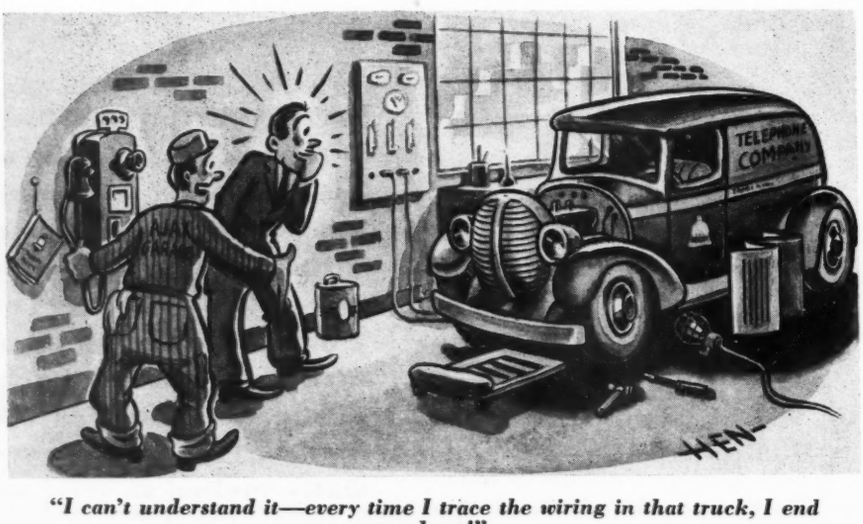
Transmission Trouble

We have a 1934 Model PE Plymouth with which we have had considerable trouble in the transmission. Our trouble is as follows: Upon application of the hand brake while the car is idling with the clutch engaged, a humming noise occurs, increasing in intensity as the hand brake lever is applied. Upon removal of the transmission from the car and thorough inspection we found nothing more than normal wear in any parts, so upon the advice of the local Chrysler agency, we replaced the main shaft rear bearing. No results—noise same as before.

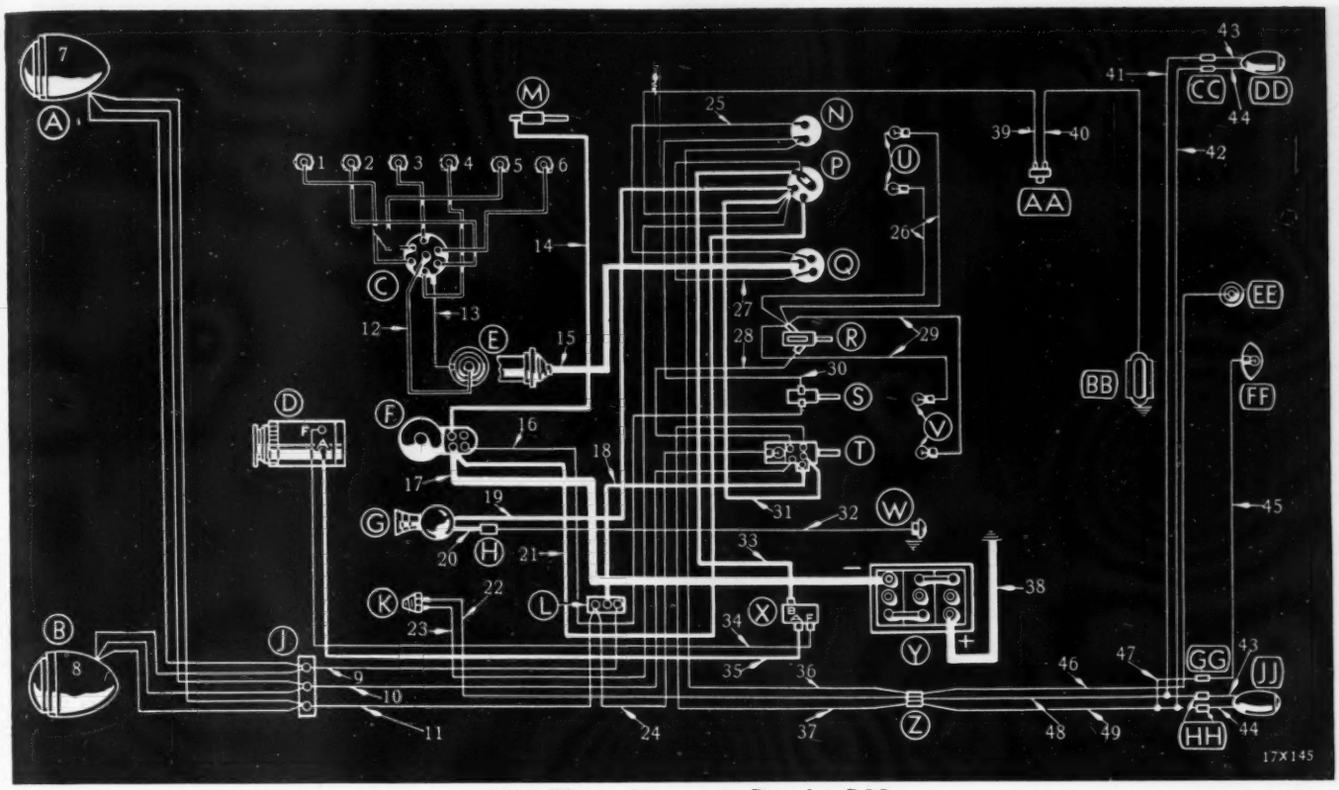
Upon the second removal of the transmission from the car, we replaced not only the rear main shaft bearing but the clutch shaft, clutch shaft bearing, pocket bearings, main shaft, all the shims on the main shaft, all the locks on the main shaft. There seems to be approximately .003 to .005 float in the main shaft which is due to the rear main shaft bearing. This float is a lateral movement and seemingly has a zero horizontal component.

The free wheeling unit was completely disassembled, checked, reassembled and locked out by means of a steel bar bolted on the outside of the transmission housing. No results—noise the same as before.

This noise, hum, grind, or what have you, does not occur until the hand brake has been pulled on three notches. On the third notch, the noise is barely audible to one listening for it. From there on the intensity doubles for each notch advanced until the hand brake is clinched tight. The hand



"I can't understand it—every time I trace the wiring in that truck, I end up here!"



1938 Wiring Diagram—Chrysler C-18

9—Headlamp upper filament cable (black) chassis wiring harness
10—Headlamp auxiliary bulb cable (yellow) chassis wiring harness
11—Headlamp lower filament cable (red)
12—Coil secondary cable
13—Coil primary cable (black)
14—Automatic choke feed cable (white)
16—Starter relay feed cable (brown)
18—Headlamp dimmer foot switch feed cable (Yellow) chassis wiring harness
19—Horn feed cable (green)
20—Horn ground cable (green)
21—Ammeter feed cable (red)
22—Signal lamp feed cable (red)
23—Signal lamp switch feed cable (red)
24—Headlamp upper beam indicator lamp feed cable (red) chassis wiring harness
25—Fuel gage feed cable (blue)
26—Instrument lamp cables (black)
27—Ignition switch feed cable (brown)
28—Instrument lamp switch feed cable (black)
29—Instrument lamp cables (black)
30—Starter switch feed cable (brown)
31—Head and tail lamp lighting switch feed cable (brown)
32—Horn button cable (black)
33—Ammeter regulator cable (black)
34—Generator field cable (green)
35—Generator armature cable (red)
36—Fuel gage cable (blue)
37—Tail lamp feed cable (white)
39—Reading lamp pillar switch feed cable (red) body wiring harness
40—Reading lamp feed cable (yellow)
41—Signal lamp cable (red)
42—Tail lamp cable (white)
43—Signal lamp wire (red)
44—Tail lamp wire (white)
45—Rear license plate lamp cable and socket assembly (white)
46—Fuel gage cable (blue)
47—Rear license plate lamp cable (white)
48—Signal lamp cable (red)
49—Tail lamp cable (white)

brake has been adjusted so that five notches will hold the car on any ordinary grade found in this part of the country. Seven notches will hold the car anywhere.

Lubrication has been changed—no results.

Countershaft was removed, countershaft cluster checked, countershaft cluster bearings checked—all O. K. as compared to new parts. Reverse idler removed, reverse idler shaft checked. O. K. Reverse idler gear is pitted due to wear on teeth faces. Transmission is quiet in reverse, low, second and high.

Shifter forks were removed, checked against new ones, replaced. Checked O. K. Speedometer gears were checked. They too were O. K. Hand brake hub and drum are so tight against speedometer gears on main shaft that it takes a 16 in. flex bar to break loose each time transmission is torn down. The front main shaft bearing, that is, clutch shaft bearing, had to be pressed into case. No wear in case at this point. Rear main shaft bearing fits into case so tight as to be necessary to force it in. No wear at this point. Rear main shaft bearing was pressed on to main shaft. No wear here.

We would appreciate any suggestion or suggestions you might have for the elimination of this trouble. J. Hammock, East Union Garage, 21st and East Union, Seattle, Wash.

THAT'S a very interesting piece of trouble you have on that 1934 Plymouth. I have studied it carefully myself and also have taken it up with several Plymouth factory men in an endeavor to find the answer.

The consensus of opinion seems to be that the trouble is caused by excessive end float in your main shaft. I can't understand that you could have a .003 to .005 in. float in this shaft when you have replaced the rear main bearing. From what I can see, you have replaced everything in that transmission with the exception of the countershaft and the countershaft bearings. And I can't see how these could cause your trouble. The only thing that I can see is that some of the parts that you have installed have been defective.

It would probably help reduce the amount of noise if you adjusted the hand brake so as to have even clearance all the way around the drum.

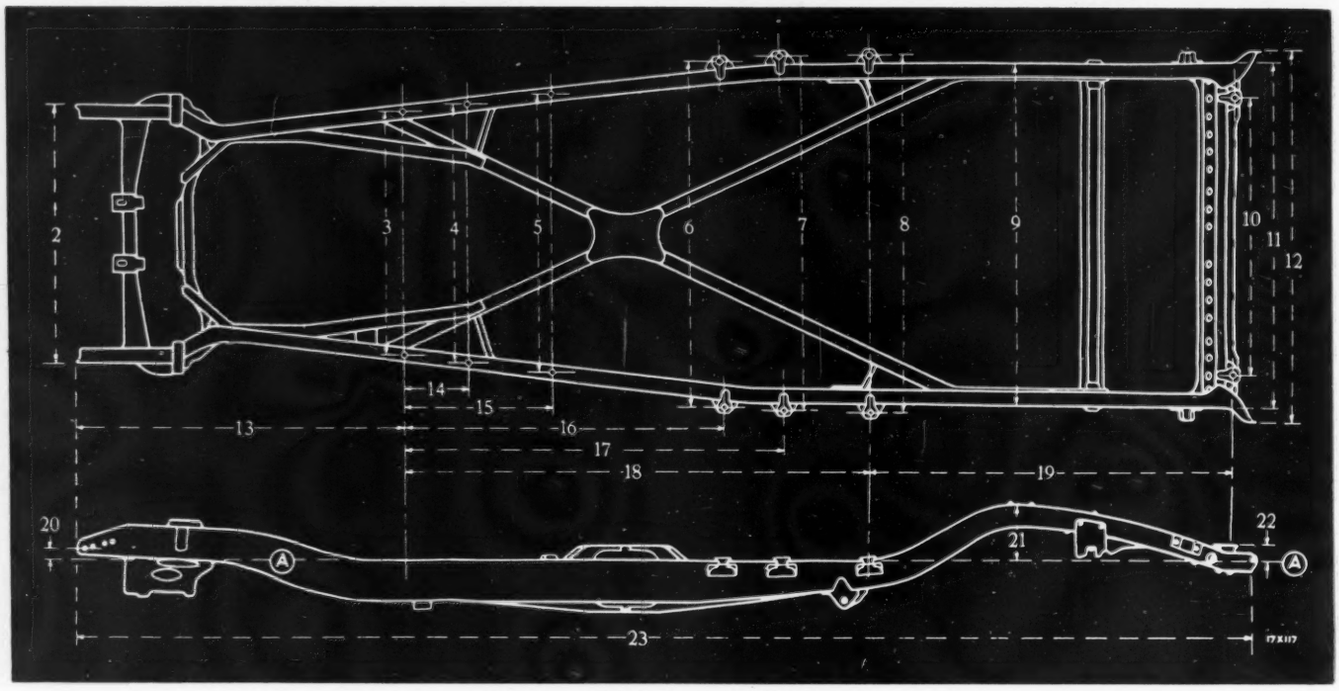
There is a slight possibility that the trouble might be aggravated by a defective clutch shaft pilot bearing in the flywheel. If you have not already checked that, I think it would be worth while doing so, but I am strongly of the opinion that you will find the difficulty in some of the parts that you have already replaced.

One thing that I would suggest that you do is to remove the cover from the transmission and then by means of a dial gage see how much the various parts move, laterally and vertically, when the hand brake is released and applied. In this way you will be able to see which parts are moving and how much, and you will be better able to see which parts are defective.

Compression Pressure

On page 62 of your Motor Age, *November, 1937, line No. 16, you note the Dodge 1937 in which you list the compression pressure at cranking speed at 140 lb., which I note is at 1000 r.p.m. I am employed at the Mayflower Garage and am interested to know if you mean that in taking*

(Continued on next page)



Chrysler—1938 Frame Alignment

Dimensions Given	in Inches	
2—36⅜ (36 7/16 — 7-pass. sedan)	7-35⅞	35 29/32
3—33 11/16	33 11/16	35 29/32
4—36⅛	36 13/16	38⅝
5—39 5/16	39¾	43⅜
6—49	49	....
7—50 13/32 (50 7/16— 7-pass. sedan)	50 13/32	53⅜
8—50 7/16 (50½ — pass. sedan)	7-50 7/16	53⅜
9—48¼ (48 5/16 — pass. sedan)	7-48 9/32	49 1/16
10—38⅞	38⅞	40⅛
11—48¼ (48 5/16 — pass. sedan)	7-48 9/32	49 1/16
12—51⅞ (51 15/16 — pass. sedan)	7-51 29/32	52 11/16
13—43 23/32 (43¾ — pass. sedan)	7-51 1/16	51 1/16
14—11 29/32	11 27/32	14⅝
15—25 5/16	25 5/16	33⅝
16—47 13/16	47 13/16	....
17—56 3/32	56 3/32	58 3/32
18—68 9/16 (85 9/16— pass. sedan)	7-68 9/16	87 9/16
19—51 5/32	51 5/32	51 5/32
20—1 11/16 (1 21/32— pass. sedan)	7-2⅛	2⅛
21—8	8	8
22—2 3/32 (2 1/16 — pass. sedan)	7-2 3/32	2 3/32
23—166 9/32 (183 5/16— 7 pass. sedan)	173⅝	192⅝
A—Top line of frame		

the compression test when you step on the starter that the motor is turning over 1000 r.p.m. or what should the compression be at cranking speed if it does not mean 1000 r.p.m.?

We removed the spark plugs, pulled the gas throttle open and the question came up that in stepping on the starter the motor was not turning over 1000 r.p.m. In other words, do you regard the cranking speed the stepping on the starter turns the motor over 1000 r.p.m. to produce 140 lb.?

I trust I have made my trouble clear. One party contends the cranking speed could be only about 200 r.p.m. Harry Bueckler, 399 Wooster Avenue, Akron, Ohio.

MOST of the car factory specifications show the compression pressure at cranking speed but some of them take a compression reading at 1000 r.p.m. instead of at cranking speed. You are quite right in stating that at cranking speed the engine is not turning over 1000 r.p.m.—rather that it is turning over somewhere between 125 and 200 r.p.m.

In the case of the 1937 Dodge, an engine speed of 1000 r.p.m. would correspond approximately to 15 miles per hour car speed. Therefore, if you are going to set the compression pressure of the cylinders of this engine—it will be necessary for you to set the speed to about 15 miles per hour and then take a compression reading.

Our specifications do not show what the compression pressure should be at cranking speed for this particular engine. The only thing we have to go by is the information released by the Dodge factory and, as mentioned above, they are one of the manufacturers whose specifications call for compression pressures at 1000 r.p.m. instead of at cranking speed.

Nose Dives

We are having plenty of trouble with the brakes on two 1938 Dodge cars. We have taken every procedure in going over the entire braking system. We have installed new brake lining. The trouble is in the front brakes, the car has a tendency to dive to the right or left. Can you be of assistance to us with this? Fred Kramer, Kramer & Peters, 926 Wealthy St., S. E., Grand Rapids, Mich.

THIS condition prevailed to a small extent on the first of the 1938 production and was later corrected in production by a slight change in the front end construction. The correction for the early models is as follows:

Through your nearest Dodge dealer, purchase two part No. 684348 rubbers and two part No. 471493 self tapping screws. Install these rubber bumpers on the lower flange of the frame—the first one being located 1¾ inches back from the center of the front spring front shackle upper bushing. The other rubber bumper is installed on the frame flange 8¼ inches forward of the front spring rear eye. On practically all of the 1938 models you will find a hole drilled in the frame flange at these points. If you should happen to find a car that does not have these holes drilled in the frame flange, drill a 9/32 inch hole. These bumpers are installed on the side to which the car dives when the brakes are applied.

Occasionally you will come across a job which dives to one side and then after you have installed these rubber bumpers, the car will dive to the opposite side. This means, of course, that you will have to install another set of bumpers on the other side. Also, there are cases in which the installation of these bumpers does not completely correct the trouble.

A further correction is made by adding a washer, part No. 676608 between the front rubber bumper and the frame flange to set the bumper closer to the spring. I have heard of cases in which one washer was sufficient and others in which two or three washers were required.

This correction applies to the Model D8 Dodge which was a 1938 model and can also be applied to the Model D5 1937 model—if you encounter this trouble with that particular model. The same correction will also apply to the Plymouth car — 1937 and 1938 models — should you encounter this type of trouble with them.

ANTI-FREEZE FACTS AND FIGURES

Cooling System Capacities by Makes and Models

AUBURN	Quarts
8-90, 8-95, 1929, 1930	22
120, 125, 1929, 1930	25
8-98, 1931	21
8, 1932, 1933	19
6-52, 1934, 1935	17½
8-50, 1934, 1935	21
12, 1932, 33, 34	37
6-654, 1936	16
8-852, 1936	20

AUSTIN	
1931 to 1936	6

BANTAM	
1938	7

BUICK	
50, 60, 1930	22½
40, 1930	17
8-50, 1930 to 1933	12
8-60, 1930 to 1933	16
8-80, 8-90, 1930 to 1933	19
40, 1934	14
50, 1934, 1935	15½
60, 1934, 1935	18
90, 1934, 1935	23
40, 1935	13
40, 1936, 37, 38	13¼
60, 80, 90, 1936, 1937, 1938	17

CADILLAC	
452, 1930, 31	28
370, 1931	26
8, 1932, 33	26
12, 1932, 1933	24
16, 1932, 1933	28
355-D, 1934, 1935	20
370-D, 1934, 1935	19
452-D, 1934, 1935	23
V8-60, 1936	30
V8-70, 75, 1936	29
V12-80, 85, 1936	19
V16-90, 1936-37	24
V8-60, 65, 70, 75, 1937	25
V12-85, 1937	17
V8-60, 60-S, 1938	24
V8-65, 75, 1938	25
16-90, 1938	30

CHEVROLET	
1929 to 1933	10
Std. 1934, 1935	10
Master 1934, 1935	11
Std. & Master, 1936	15
Std. & Master, 1937, 1938	14

CHRYSLER	
Six, 1930	12
8, 1930, 6, 1931	16
Del. 8, 1930, 31, 32	19
Imp. 8, 1930, 1931	26
Six, 1932, 33, 34	16
Roy 8, 1933	19
Imp. 8, 1933	20
Imp. Cust. 8, 1933	27
Roy. 8 CU. 1934	23
CV. CX, 1934	23
6-C6, 1935	17
8-CZ, 1935	20
8-C1, C2, C3, 1935	19
CW, 1935	24
6-C7, 1936	19
8-C8, 1936	22
8-C9, C10, C11, 1936	17
C-16, 1937	20
C-14, 1937	22
C-15, 1937	21
C-17, 1937	17
C-18, 1938	20
C-19, 1938	20
C-20, 1938	20

DE SOTO	
St. 8, 1930	11
St. 8, 1931	13
Six, 1931, 1932	15
Six, 1933	16
Six, 1934	20
Six, 1935	17
Six, 1936	19
S-3, 1937	20
S-5, 1938	20

ESSEX	
Six	19
Super six, 1932	17

DODGE	
Vict. 6, 1928	12
Six, 1929, 1930	16
8, 1930	17½
Six, 1931, 32, 33	14½
Eight, 1931, 32, 33	16
Six, 1934	18½
Six, 1935	17
6-D2, 1936	14
Six, 1937	16
Six, 1938	15

FORD	
T, A, B	12
V-8, 1932, 33, 34, 36	22
V-8, 1935	20
V-8-60, 37, 38	15
V-8-85, 37, 38	22

GRAHAM	
Std. 6, 1930	18
Spec. 6, 1930, 1931	20
Spe. Std. 8	26
Cust. 8-34, 1931	26
8, 1931 to 1934	20
6-74, 1935	15
6-73, 1935	17½
8-72, 1935	18
8-75, 1935	20
6-80, 1936	11
6-90, SC-110, 1936	15
6-85, 1937	11
6-95, SC-116, SC-120, 1937	15
6, 1938	13½

HUDSON	
8, 1930 to 1933	18
Six, 1933	17
8, 1934, 1935, 1936	23
6, 1935	19
6-63, 1936	13
6-73, 1937	13
8-74, 75, 76, 77, 1937	20
112, 1938	12
Terra., 1938	12½
6, 1938	12½
8, 1938	17½

HUPMOBILE	Quarts
S, S-2, 1930-'31	14
C, 1930, 1931	20
H, U, 1930, 1931	28
L, 1930, 1931	16
216, 1932	13
222, 1932; 332, 1934	21
226, 1932; 326, 1933	24
321, 1933	21
417, 1934, 421-J, 1934	16
427, 1934	24
518, 1935	20
321, 527, 1935	24
6-618G, 1936	18
8-621N, 1936	21½
6, 1938	18
8, 1938	21½

LAFAYETTE	
1934, 1935, 1936	19

LASALLE	
328, 1929	21
340, 1930; 345, 1931	24
1932, 1938	26
St. 8, 1934, 1935	18
8-36-50, 1936	16½
V-8, 37-50, 37, 38	25

LINCOLN	
1928 to 1930	32
8, 12, 1931 to 1933	34
12-1934, 1935, 1936, 1937, 1938	32

LINCOLN ZEPHYR	
H, 1936, 1937	27
1938	30

MARMON	
68, 78, 1929	20
Roosevelt, 8-69	16
8-79, Big 8, 1930	28
70, 1931	16
88, 1931; 8-128, 1932	28
16, 1931, 1932	29
16, 1933	34

MARQUETTE	
1929	12

NASH	
8-70, 1930	15
970, 1931	13
8-80, 1930	16
980, 1931	20
Twin 8, 8-90, 990	22
Big 6, 1932	17
Spe. 8, 1932	21
Adv. Amb., 1932, 1933	22
1120, 1933	19
Std. 1933, Spe., 1933	16
Big 6 1120, 1934	17½
Adv. 8 1280, 1934	21
Amb. 8 1290, 1934	22
6, 1935, 1936	17½
400, 1935, 1936	18
Adv. Amb., 1935	21
Amb. Super 8, 1936	21
H, 1936, 1937	27
Lafayette 400, 3710, 1937	20
Amb. 6, 3720, 1937	17
Amb. 8, 3780, 1937	18
Lafayette, 1938	20
Amb. 6, 1938	20
Amb. 8, 1938	18

OAKLAND	
Six	12
8, 1930, 1931	25

OLDSMOBILE	
1929, 1930, 1931	13
6 and 8, 1932	16¼
6, 1933	17
6, 1934	15
8, 1933, 1934	19
F35, F36	13
L35, L36, F37	16
L37	20
F38	17
L38	21

PACKARD	
901, 902, 1931	20
903, 904, 1931	25
Lt. 8, 1932	19
Std. 8, 1932	20
Del. 8, 1932	25
12, 1932-36	40
8, 1933-36	20
Super 8, 1934, 35, 36	22
120, 1935	16½
120-B, 1936	18
Six-115-C, 1937	17
120-C, 1937	20
8-1500, 1, 2, 1937	24
12-1506, 7, 8, 1937	40
Six, 1938	15
8-1601, 1938	16
Sup. 8, 1938	20
Twelve, 1938	40

PEERLESS	
125, 1929	20
Std. 8, 1930	21
Std. 8, 1931	14
Master & Cust., 1931, 1932	23½

PIERCE-ARROW	
8, 1929 to 1934	26
12, 1932, 1933, 1934	38
8-845, 1935	28
12-1245-55, 1935	40
8-1601, 1936 & 8-1701, 1937	25
12-1602-03, 1936 & 1702-3, 1937	38

PLYMOUTH	
Up to 1931	14
1932	15
1933	13
1934	14
1935	15
1935, 1936, 1937	15
1938	14

PONTIAC	
Up to 1928	10
1929, 1931, 1932	14
1930	13
8, 1932	25
8, 1933, 1934	15
6, 1935	13½
8, 1935	14
6, 1936	15
8, 1936	16¾
6, 1937, 1938	16
8, 1937, 1938	19

REO	
15, 1930	14
C Fly. Cloud, 20, 25, 1929, 30	19
6-21, 6-25, 1931	17
8-21, 8-25, 1931, 1932	16
8-31, 8-35, 1931	23
S, 1932, 1933	20
Royale, 1932, 33	23
S4, 1934	19
Fly. C., 1935, 1936	18
Roy., 1935	20

STUDEBAKER	
Std., all	17
Spe., 1925, 1926	18
Big 6, 1926, 27	19
Dict., 1928	14
Com., 1928	20
Pres., 8, 1928	20
Dict. 6 & 8, 1929	15
Com., 6, 1929	17
Com., 8, 1929, 1930	14½
Pres., 1929, 1930, 1931	21
Six, 1930, 31, 32	12½
Dict. 8, 1930, 31	18
Com., 70, 1931	14
Dict., 62	14
Com. 71	16
President 91	21
Six 56, 1933	14
Com., 1933	16
Pres. 82, 1933	18
Pres. 92, 1933	23
Dict. 6, 1934	15½
Com. 8, Pres. 8	18½
Dict. 6, 1935	16½
Com., 1935	21½
Pres., 1935	21½
Dict., 1936	14
Pres., 1936	17
Dict., 1937	13
Pres., 1937	15½
Sta. Com., 1938	14½
Pres., 1938	17

TERRAPLANE	
Six, 1934	18
Six, 1935	16
Six, 1936, 1937	13

VIKING	
1929, 1930	33

WHIPPET	
96A, 1930	11½
98A, 1930	15½

WILLYS	
Six	14
Eight	20
77, 1933-36	9
37, 1937, 1938	11

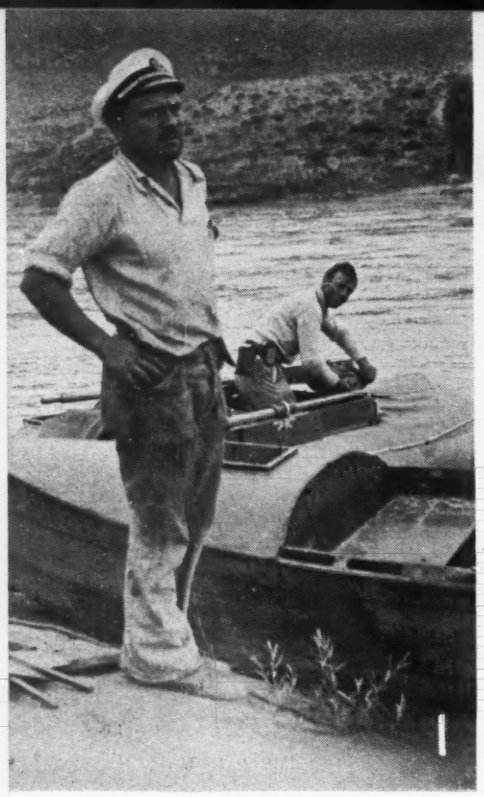
WILLYS KNIGHT	
70, 1926 to 1929	17
87, 1930	17
70A, 1928	16
66D, 1931, 1932	17½
95, 1931, 1932	15½

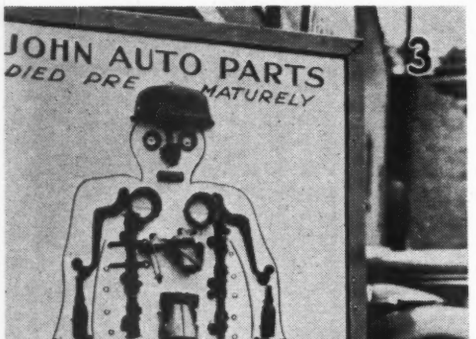
Quarts of Anti-Freeze Required

(With Specific Gravity of Solutions at 60° Fahr.)

Temperature Expected (Fahr.)																			
15° ABOVE				ZERO				10° BELOW				20° BELOW				30° BELOW			
*ALCOHOL Sp. Gr. .9700	GLYCERINE Sp. Gr. 1.080	E. GLYCOL Sp. Gr. 1.040	METHANOL 100%	*ALCOHOL Sp. Gr. .9600	GLYCERINE Sp. Gr. 1.108	E. GLYCOL Sp. Gr. 1.050	METHANOL 100%	*ALCOHOL Sp. Gr. .9500	GLYCERINE Sp. Gr. 1.120	E. GLYCOL Sp. Gr. 1.060	METHANOL 100%	*ALCOHOL Sp. Gr. .9400	GLYCERINE Sp. Gr. 1.130	E. GLYCOL Sp. Gr. 1.065	METHANOL 100%	*ALCOHOL Sp. Gr. .9200	GLYCERINE Sp. Gr. 1.144	E. GLYCOL Sp. Gr. 1.070	METHANOL 100%
1 to 5	1 to 2	1 to 4	1 to 6	2 to 5	1 to 1½	1 to 3	1 to 4	1 to 2	3 to 4	2 to 5	1 to 3	1 to 2	4 to 5	1 to 2	1 to 3	3 to 5	1 to 1	1 to 2	1 to 2

Find the capacity of the car in question, then refer to the table above for the quantity of anti-freeze required for the temperature protection desired.
The terms "1 to 5", etc., mean 1 quart of anti-freeze to 5 quarts of water, etc.
* The alchol listed in this table corresponds to 188 proof. When alcohol of 2 00 proof is used, reduce the amounts by ten per cent.





1. Buzz Holstrom, service station operator, shown here beside his boat, sets out from Green River, Wyo., on an 1800 mile trip via the Green and Colorado Rivers to Mexico. His companion, Amos Burg, will photograph the trip for exhibition at the San Francisco World's Fair.

2. Colonel Roscoe Turner kisses the propeller of his Pesco Special plane after winning the Thompson Trophy event at the National Air Races. Turner's peak lap was at 283.718 m.p.h., setting a new speed mark.

3. Display board at a garage in Green Bay, Wis. "Skeleton" of the figure is made from auto parts damaged through lack of lubrication.

4. The Birmingham (Ala.) Auto Trades Association held this Jalopy Derby in which twenty-three entries took part. First prize went to J. A. Salder, repairman, who drove a 1914 Ford around the 35 mile track at an average speed of 20 m.p.h.

5. The two oldest cars entered in the Birmingham Jalopy Derby were this 1903 Cadillac and 1904 Franklin. Owner and driver of the Cadillac is Tate Shaner, Shaner Auto Service Co.

Still More Speed

Jenkins Readies for Title Attempt at Bonneville Saltbed

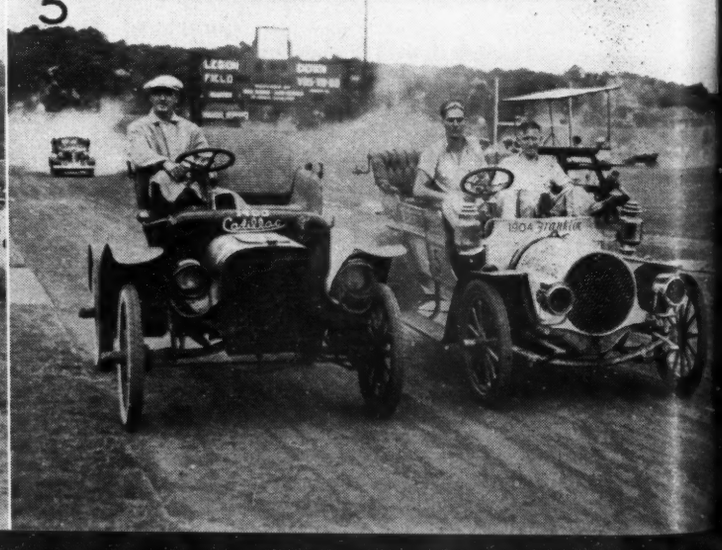
Confronted with the difficult problem of bettering a new land speed record of 357.5 miles per hour, Ab Jenkins, the first American to build a super-speed racer since 1929, had the assurance that a faster gait would place him on racing's throne for at least a year.

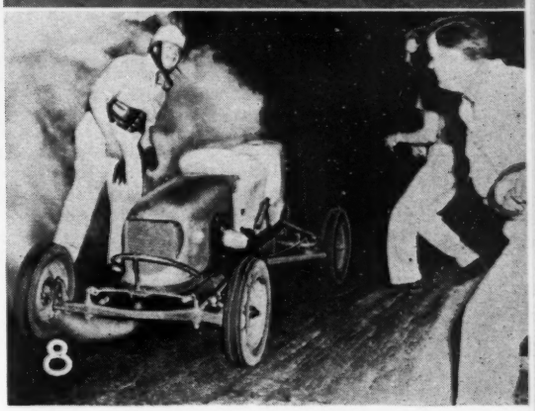
The hazard of becoming "king for a day"—like John Cobb—was removed early this month when Captain George Eyston sailed for his native England to repair a wrecked "Thunderbolt."

John Cobb, who ruled 24 hours with a gait of 350.2 miles per hour, embarked the last week in August with the promise that he would return to Utah's Bonneville Saltbed in 1939 with a faster "Railton" speedster.

With Eyston and Cobb having ended their Bonneville encampment which dates back to July, when the record stood at 311.42 miles per hour, Jenkins was in complete charge of the expansive salt flats.

(*Continued on page* 48)





Roberts Official 1938 Track Champion

Thousand Points Nets Crown for Indianapolis Winner
Shaw and Miller Take Second and Third Honors

Floyd Roberts, winner of this year's record-breaking International Sweepstakes at Indianapolis, was officially designated automobile racing's thirtieth National Champion.

The Contest Board of the American Automobile Association, governing body of big league speed competition, distributed honors to 21 drivers when it closed the books on the 1938 title race with verification of results at Syracuse, N. Y., on Sept. 10.

In the final tally, Wilbur Shaw, 1937 Indianapolis winner and champion and second in this year's Indianapolis "500," was credited with second position. Other drivers, including sixth position, retained the title posts they earned at Indianapolis. They are: Chet Miller, third; Ted Horn, fourth; the late Chet Gardner, fifth; Billy DeVore, sixth. Although DeVore finished eighth at Indianapolis, the AAA credited him with sixth place on the standing because Herb Ardinger did not drive the entire route at Indianapolis. Ardinger was docked points for the miles he allowed relief drivers, Russ Snowberger and Cliff Bergere, to wheel his mount. The relief pilots do not appear on the title roster, however, because they started the "500" in other qualified cars under their own entries.

The first advantage gained in the 100 miler at the New York State Fair at Syracuse is noted in seventh position where Duke Nalon was promoted for the 135 points gained for third place in the century. Nalon's 125 points for eleventh place at Indianapolis had landed him in eleventh position following the "500," but his final total was sufficient to boost him over Joe Thorne. Thorne finished ninth at Indianapolis.

Failing to gain points at Indianapolis, Jimmy Synder could climb no higher than tenth in the roster with his 20 points for victory at Indianapolis. Rex Mays' 165 points for sec-

(*Continued on page* 42)

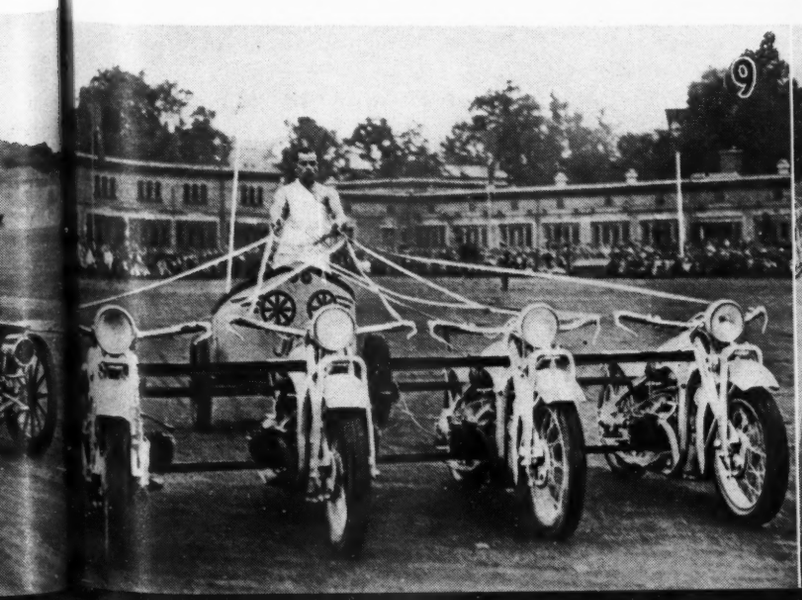
6. **Speed king Capt. George Eyston who holds tightly to his crown. Last month he set a new mile mark of 345.49 m.p.h., John Cobb pushed it up to 350 so Eyston tried again and set the present record of 357.5 m.p.h.**

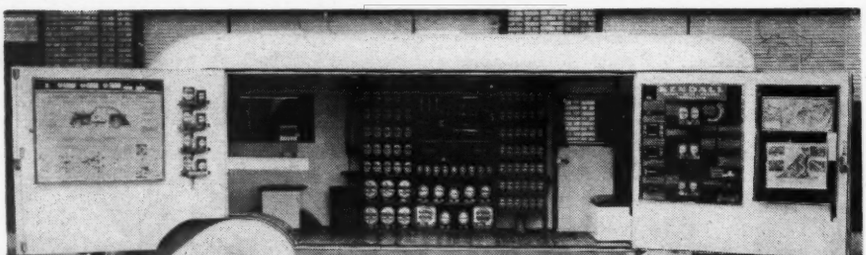
7. **Count Theo Rossi di Montelera of Italy, who took his long name and his fast boat over the Golf Cup course on the Detroit River, Labor Day, to win the anuual regatta.**

8. **Sam Kalmanson jumped to keep the seat of his pants cool when his midget racer burst into flames recently at the Westbury, L. I., track.**

9. **Not everybody's mind in Germany is on the Czechoslovakian problem. Here a German soldier hitches four motorcycles to a chariot and drives them Roman style at a recent sports festival.**

10. **Earl Cooper (left), former race driver, and Barney Oldfield (Right) served as starters in a recent jalopy road race held in Pasadena, Cal. In the first car is E. F. Coop, Pasadena Fire Chief.**





Traveling Display One of two demonstration coaches built by the Linn Trailer Co. for Kendall Refining Co. Truck is a 1938 Ford Cab-over-engine with 173 in. wheelbase. With side doors more than five feet high and six feet long, 24 ft. of display space is available when the doors are opened. To be used in meetings, lubrication schools and trade demonstrations, one coach is scheduled for operation in the Middle West and another for New England. A third coach, similarly equipped but of the house trailer type, has been in use in the Southeast for the past year.

Charles E. Duryea

Charles E. Duryea, widely credited as the man who invented America's first gasoline buggy, died in Philadelphia on Sept. 28 after a long illness. He was 77 years old. He was a prolific inventor and publicist and in his later years had been active as a consultant on engineering and patents and on matters of automobile history.

Duryea cars were built intermittently from 1892 to 1914 and in considerable variety. All were distinguished for their originality and economy. One, for example, had all the functions of steering, braking, gear changing and engine spark and throttle control combined in a single lever. None of them succeeded in catching the public fancy in a large way, however, and the inventor died a comparatively poor man.

Ethyl Gasoline Sales

Sales of Ethyl gasoline during the first six months of 1938 rose 30.8 per cent compared with the same period of 1937, according to reports to the Ethyl Gasoline Corp. from customer oil companies. One hundred and eighteen oil companies throughout the United States contributed to this report.

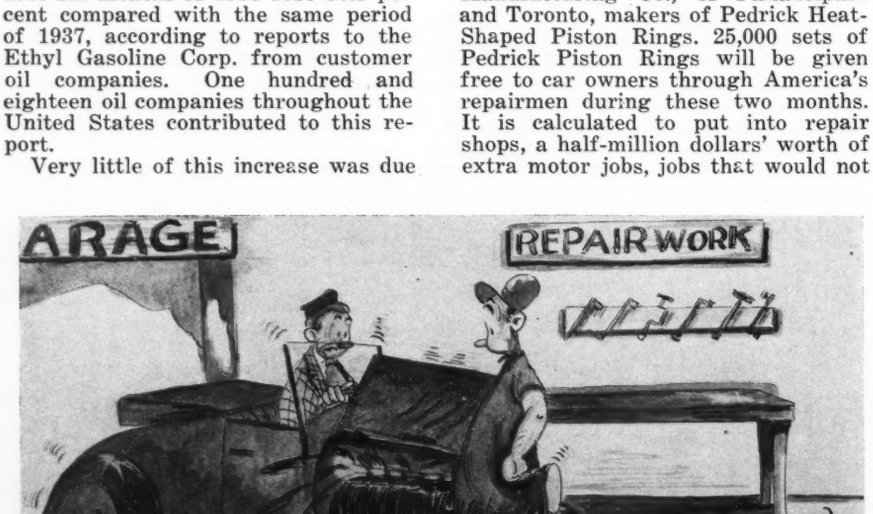
Very little of this increase was due to the general increase of gasoline consumption, the major part being due to passenger car owners changing from other grades to premium gasoline, officials of the Ethyl Corporation explained. The gains ranged from 8 per cent in Utah to 127 per cent in Mississippi. North Dakota, with a loss of 16 per cent, was the only state to show a decrease in gallonage.

The largest divisional percentage advance—49 per cent—was registered by the Atlanta Division of the Corporation, comprising the states of Alabama, Florida, Georgia, Louisiana, Mississippi, and Tennessee.

Pedrick Announces Plan to Put Motor Jobs Into Shops

A nation-wide plan to put $500,000 worth of extra motor jobs into repair shops and car-dealer service departments during October and November has been announced by Wilkening Manufacturing Co., of Philadelphia and Toronto, makers of Pedrick Heat-Shaped Piston Rings. 25,000 sets of Pedrick Piston Rings will be given free to car owners through America's repairmen during these two months. It is calculated to put into repair shops, a half-million dollars' worth of extra motor jobs, jobs that would not otherwise be done in these two months.

The timeliness of the plan is supported by the fact that this year, for the first time in the history of the parts business, an exceptionally large number of cars come of piston-ring age in the months of October, November and December, because two years ago the industry sold hundreds of thousands of new cars during October, November and December. 722,260 cars become two years old this Autumn, according to Wilkening, and ready for motor reconditioning.



"It must seep out around the rings!"

Polaroid May End Headlight Glare

An article in the September issue of *Fortune* magazine entitled, "In the Light of Polaroid," reveals that headlight glare may be eliminated entirely through the universal use of Polaroid, the material that polarizes light.

The importance of the application of this product, of which the Polaroid Corp., Boston, is manufacturer, to headlights is stressed in the article in pointing out that the death rate in night driving is almost triple the daytime figure.

The principle of light polarization has been discussed previously in MOTOR AGE and should not be unfamiliar to our readers. The *Fortune* article states that two systems for using Polaroid to eliminate headlight glare have proved workable under road conditions.

At present there are two principal objections to the immediate adoption of Polaroid by manufacturers, it is stated. One is that headlights must be made more powerful to penetrate the Polaroid material. The other is cost, for at present it would cost three to four dollars to equip each vehicle and all vehicles must be so equipped to make polarization of value to the driver.

Sterling Announces New Ignition Cable

A new ignition cable for automotive use has been announced by the Sterling Cable Co., 3529 Twenty-fourth Street, Port Huron, Mich. Known as the Steelductor cable, this product has been in use for about four years on aircraft engines, but has recently been developed for automotive use. It is claimed to give improved engine performance through eliminating electrical losses, and to increase the life of distributor points and spark plugs.

Hoof Appoints Ad Agency

The appointment of Van Auken-Ragland Advertising Agency has just been announced by Mr. A. C. Hoof, President of Hoof Products Co., makers of the world-famous Hoof Cantilever Governors.

Correction

Photographs of the ultra-modern garage in Venice, Italy, which appeared in last month's issue, were through the courtesy of the Hamilton Wright Organization, Inc., newspaper syndicate features, to whom we failed to give credit.

Death Flags Gardner At Flemington Track

Chet Gardner, long a familiar figure on automobile race tracks throughout the country, crashed to his death during his qualifying run at the Flemington Fair race track, Flemington, N. J., on Sept. 3. A child attempted to cross the track, and when Chet swerved his car to avoid hitting the child the car went into a spin, overturned and threw the driver out on his head. He was dead when officials reached him.

Gardner had been racing for 13 years and had finished in the money

Chet Gardner

consistently. He placed fifth in the 1938 Indianapolis classic, seventh in 1935 and fourth in 1933, and was a member of the Champion 100-Mile-An-Hour Club. The points he had accumulated gave him fifth place in the 1938 National Championship standing despite the fact that his death occurred a week prior to the Syracuse race.

Van Norman Adds to Plant

Factory space of 7500 sq. ft. has been added to the plant of the Van Norman Machine Tool Co., Springfield, Mass. A new boring mill, a 48 in. by 48 in. planer and a large lathe have already been added to present equipment and other new machinery will shortly be installed.

This building has been built in anticipation of future added business so that the company may be prepared to cope with whatever demands it may be faced with. Part of the building will be used for the manufacture of certain heavy machines acquired in the recent purchase of the machine tool business of the Producto Machine Company of Bridgeport, Conn., and part of the building will be used as additional automotive assembly space.

Unser Wins Peak Climb

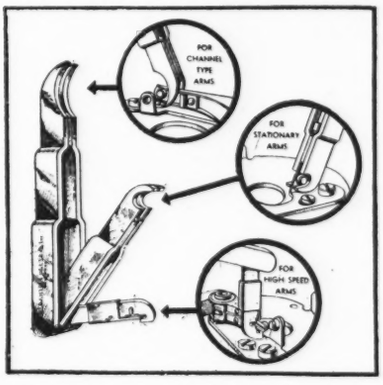
Turning in his fourth victory and establishing a new alltime record for the 12½ mile climb up treacherous Pike's Peak at Colorado Springs, Colo., on Labor Day, Louis Unser became undisputed king of the annual hill climb.

He negotiated the distance over an ice-covered highway dotted with hairpin curves in 15 minutes, 49.9 seconds. This gait bettered his own record of 16 minutes, 1.8 seconds established in 1934. The previous record was 16 minutes, 47.4 seconds credited in 1932 to the late Glen Shultz.

Showroom? **We thought at first this was a picture of a Blackhawk clinic, but the Ammon R. Smith Auto Co., York, Pa., has all of these Porto-Power units and keeps them all busy.**

Aligns Distributor Points

Guaranteed Parts Co., Inc., 250 West 54th St., New York City, has introduced a new tool for aligning distributor points. Three blades are provided to fit channel type arms, high speed arms and the stationary point. The tool will work on all points used



in Delco-Remy and Auto-Lite distributors. It is small enough to be carried in the pocket or in a small kit, and strong enough to stand up under continuous service.

Cold Dip Process For Resilvering Reflectors

The Clapper Chemical Co., Everett, Pa., has announced the Lectro-Sil cold dip outfit for resilvering old, dull, tarnished or peeled headlight reflectors. Using no batteries or heat the Lectro-Sil process is described as very simple to use, requiring only that the plating be buffed off the old reflector which is then dipped into the Lectro-Sil silver solution. Plating is said to be accomplished in "less than a minute."

Lectro-Sil outfits are available in two sizes. The large outfit, containing one gallon of silver solution, at $19. The smaller outfit, containing one-half gallon of silver solution, at $14. In addition to the silver solution each outfit contains clothbuffs, silver polish, polishing cloths, buffing compound, polishing compound, two color display sign and complete illustrated instructions.

Greiner Appointed to Nash

Karl M. Greiner, since November, 1934, Buick zone service manager in Detroit, has been appointed retail service promotion manager of the Nash Motors Division of Nash-Kelvinator Corp., according to an announcement by W. A. Blees, Nash's general sales manager.

Mr. Greiner, who will work closely with Nash distributors and dealers in developing the service end of their business, is widely known in the automotive field as a service executive.

"If it knocks once, it's opportunity—if it knocks again it needs new bearings!"

Pontiac

(*Continued from page 16*)

manifold has been redesigned to suit the exhaust manifold construction, incorporating slightly thicker walls at both center branches to support the carburetor and air cleaner. Thermostatic heat control and steel tube riser remain the same but without the thermostat air tube.

An improved form of remote control gear shifting in now standard equipment. The new mechanism comprises a single solid control shaft for transmitting both shift and cross-over movement. Its upper end terminates in a ball which is housed within a threaded fulcrum bushing in the shift lever. This bushing also provides the means for adjusting the location of the shift lever. At its lower end, the control shaft is welded to a short stamped lever which connects with the linkage on the transmission.

Biggest development comes in the new ride, featuring variable rate rear leaf springs, in addition to improved knee action front end. The rear springs are of special design embodying a section of auxiliary or helper springs which come into action in proportion to the applied load.

Spring friction control is achieved by the use of tightly fitting metal covers with sealed-in lubrication for the spring leaves. Spring mountings are cushioned in rubber as before. Spring leaves are tapered at the ends to permit flexibility and eliminate areas of high pressure. Direct acting hydraulic shock absorbers are employed, with a dual piston rod seal replacing the single type formerly used.

Front suspension changes involve chiefly the adoption of pressed steel lower control arms, slightly shorter and lighter than the forgings previously used. The threaded steel bearings are protected by rubber seals.

Steering has been improved by the use of link parallelogram set-up, incorporating a horizontal rod running from the end of the pitman arm to an idler link on the other side rail. The movement of the rod is always parallel to the front wheel axis. Two short tie-rods then connect with ball joints in the parallel link. Tie-rod centers have sufficient spread so that they line up with the fulcrum points of the front suspension, eliminating most of the reaction due to vertical movement of the wheels.

The propeller shaft now is practically a straight line connection beween the transmission and the hypoid rear axle. On the Deluxe Eight and Six there is an extension of the transmission, while on the Quality Six which has a shorter wheelbase, the extension has been eliminated.

The transmission is entirely new, 9/16 in. shorter than the former model and somewhat lighter in weight, but with greater rigidity. However, it retains the same gear face widths and torque capacity. Chief change comes in the provision for remote control shifting with simplified and improved shifting control. Gear ratio in low gear has been slightly changed to provide better performance in low gear.

Ease of shifting, as well as positive action, are secured by the new gear shift mechanism built into the case.

Brake drums are 11 in. in diameter, using chrome-nickel iron material. This change, together with the use of a special type of primary lining is said to improve brake performance and to increase life.

K-D FOG LAMPS
Save you from Error and Terror

Time now..Prepare for
FOG, DUST, SLEET,
SNOW, RAIN
and for fair weather, too

MODEL NO. 855

America's Most Beautiful and Efficient Fog Lamp

SCIENTIFICALLY developed to penetrate and overcome the driving handicaps of adverse weather . . . and efficient auxiliary lamps in fair weather.

Magnificent lamps of unsurpassed dependability . . . QUALITY BUILT. Dependable . . . sturdy . . . handsome! Priced within reason.

Write TODAY for
NEW CATALOG NO. 38—you need it!

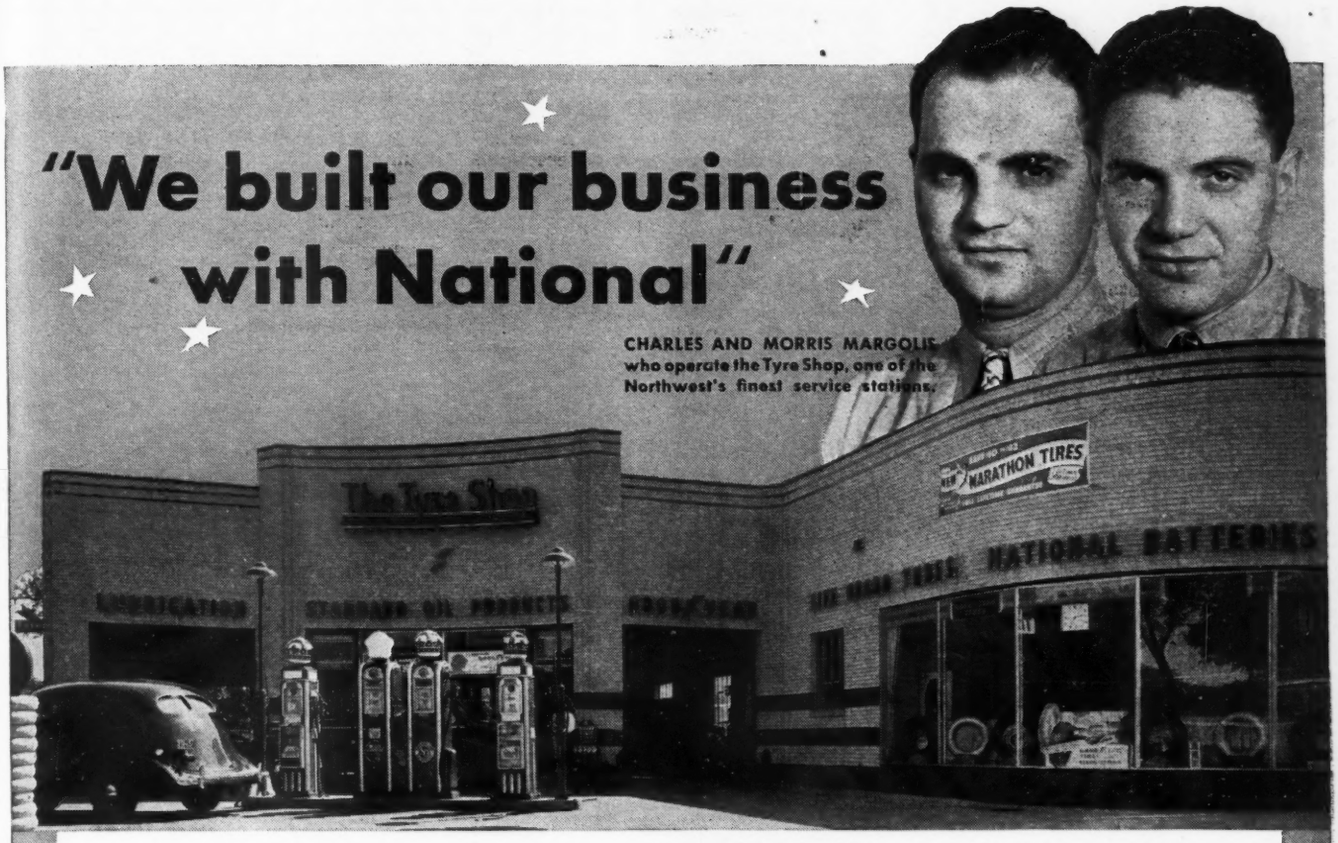
Members by invitation—Rice Leaders of the World Association

THE K-D LAMP CO.
CINCINNATI, OHIO

Edison Announces New High Compression Plug

A new high compression spark plug has been announced by the Edison-Splitdorf Corp., West Orange, N. J. The design of the new plug combines a 10 mm. porcelain with shells of all standard sizes, giving wider heat ranges and faster heat dissipation. Edison engineers report that the new HC plug avoids pre-ignition and that the new "condenser action" gap assures a hotter spark and surer firing under high compression. The plug includes the exclusive Edison built-in, leak-proof gasket.

"We built our business with National"



CHARLES AND MORRIS MARGOLIS who operate the Tyre Shop, one of the Northwest's finest service stations.

Tells how great battery line helped Tyre Shop become leading super-service station

Thirteen years ago the Margolis brothers, Charles and Morris, opened a tire shop in St. Paul, Minnesota. They had big plans for this little business . . . dreamed of making it one of the finest super-service stations in all the Northwest. Today, those dreams have come true. The Tyre Shop has arrived!

Did the sale of tires and gasoline alone account for the rapid growth of this business? Not by any means. Here, in the words of Mr. Charles Margolis, is the important key to the success of this service station:

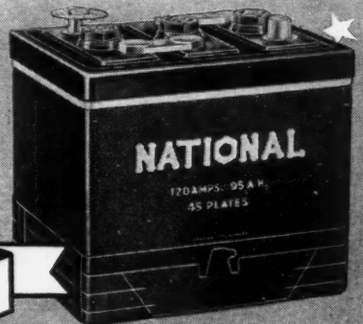
"When we first started to expand our business, back in 1927, we decided to sell batteries. After carefully checking many lines we chose National. We've been selling them ever since. For these reasons:

1. The National Battery Company is a consistent and progressive leader in the industry.
2. National products are high in quality, fair in price and profits.
3. National's distribution set-up means fast, efficient service.
4. The National name is well known to the public.
5. The entire National organization has always co-operated with us 100% on any dealer problem."

We're proud of these words. And we believe that they accurately reflect the sentiments of hundreds of dealers who have found it profitable to push the National line season after season. Would you like to join them? Write National Battery Company, St. Paul, Minnesota.

NATIONAL 110—Genuine spun glass construction at a new low price.

KATHANODE—Guaranteed as long as you own your car.



THE NATIONAL—The standard battery of the National line. 51 plates. 21 months type.

EACH A LEADER IN ITS CLASS

NATIONAL BATTERIES

Packard

(*Continued from page 14*)

suspension system, characterized as a damped elastic system which eliminates all transverse vibrations.

Packard has succeeded in the development of a complete suspension system in which the vibration is damped by means of a fifth shock absorber mounted in the rear stabilizer linkage. The complete system also incorporates new rear springs, and a special shock absorber mounting in the front suspension.

As illustrated, the fifth shock absorber is a specially calibrated Houde unit, quite similar to those used at the wheels, mounted in the rear stabilizer arm.

Last year, Packard pioneered the use of rear leaf springs with special metallic button inserts at the leaf ends. For '39, the friction control button set-up has been altered considerably, relying upon molded rubber inserts on all spring leaves except the last two. The latter are fitted with high antimony lead buttons housed within a special brass retainer with a molded rubber seal to hold lubrication. Function of the lead inserts is to provide a positive damping control for low frequency vibrations; also for full-load passenger loading control. Their use simplifies the problem of shock absorber calibration.

Major changes are offered in the transmission system of the new Six, Eight, and Super Eight lines. Remote control of shifting is by means of the lever conveniently mounted under the steering wheel.

In line with the adoption of remote control, the transmission for the Six, Eight, and Super Eight, used interchangeably on all three, has been redesigned so as to incorporate the features of the Packard Twelve unit. All gears, except reverse, now are constant mesh with dental clutches for engagement.

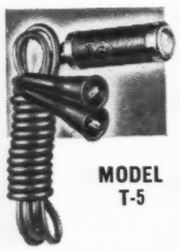
Most significant optional feature on all lines, except the Twelve, is the new solenoid-controlled overdrive transmission whose function is controllable through the accelerator pedal, at the operators will. The overdrive cuts in automatically at around 30 miles per hour but the transmission can be made to shift down into direct drive instantaneously simply by depressing the pedal sharply. This is accomplished by means of a special electrical hook-up connected with the pedal.

Wherever the overdrive is specified, Packard also supplies a special vacuum booster for the throttle linkage which tends to speed up the engine slightly on occasions when the vehicle is coasting in overdrive. This prevents the engine from stalling in heavy traffic.

The same hypoid rear axle, time-tried by Packard, is used on the Six, Eight, and Super Eight. However, the unit for the Super Eight is fitted with a special mechanism to take the torque of the big engine. This consists of a special roller cage bearing for the ring gear support, so fitted as to limit the deflection of the ring gear at the point of contact to a deflection of 0.005 in. (max.)

You Can Service Cars BETTER and FASTER with NIEHOFF PARTS AND PORTABLE PRECISION INSTRUMENTS

Gear your shop to the most profitable business with these NIEHOFF Portable Precision Instruments that take all of the guesswork out of trouble shooting. They are a standout for eye appeal, construction and performance. They convince customers, save mechanics' time and add a professional touch to every job that advertises your shop and service.



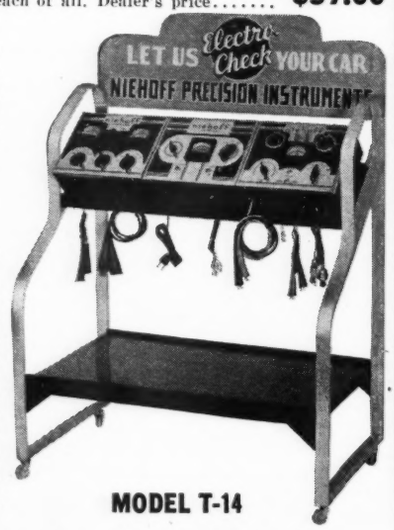
MODEL T-5

TIMING LIGHT T-5—A handy quick-action instrument for accurately checking ignition timing. Slips easily between fan assembly and engine or into other close quarters. Accurately focused to give maximum illumination. Durable shock-proof case. You can't afford to be without it at the low Dealer's Price..... **$3.75**

COILOMETER T-12—Here's another NIEHOFF Portable Precision Instrument that will quickly turn your inventory of coils, points, condensers, caps, plugs and rotors into dollars. Operates from car battery and makes testing of these parts rapid and easy. A silent salesman that will pay dividends—particularly at the low Dealer's Price..... **$45.00**

CONDENSOMETER T-11—You can turn condenser check-up into profits faster and easier with this super-precision instrument that clinches sales and satisfies customers. No shop should be without this business builder that is priced within reach of all. Dealer's price..... **$39.00**

GENEROMETER T-10—With cold weather just around the corner, you'll have daily use for this master electrical testing unit that makes every generator, voltage, regulator and relay test simple and easy. Operates from car battery without use of outside current. You'll be money ahead with this NIEHOFF Instrument that is priced down to enable you to pay out of profits. Dealer's Price..... **$42.00**



MODEL T-14

NIEHOFF EASY-ROLL INSTRUMENT DISPLAY STAND T-14

An attractive and profitable addition to any shop. Stand is of heavy all-steel construction, mounted on heavy rubber covered casters. Shelf at top for displaying three NIEHOFF Precision Instruments and large shelf below for tools, battery, parts and other NIEHOFF Instruments. Finished in bright orange and black duco. Dimensions: 50 inches high by 38 inches wide by 18 inches deep. Shipped knocked down. Shipping weight 30 lbs. Can be quickly assembled with a pair of pliers.

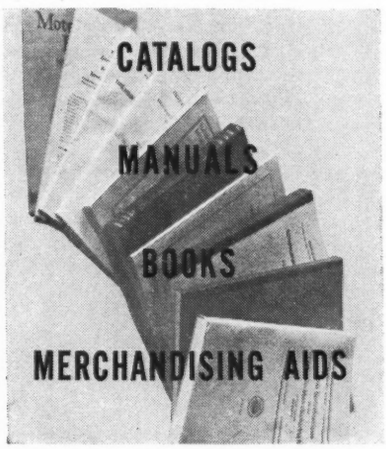
Spotlight your tune up service with this Easy-Roll Stand that keeps tools and instruments within easy reach. You'll want it at the low Dealer's Price..... **$12.00**

A small down payment will bring this equipment to you promptly. Convenient payments arranged through Commercial Credit Company plan. ORDER YOURS TODAY or write for complete descriptive literature of this equipment.

BRANCH OFFICE: 1342 S. FLOWER STREET, LOS ANGELES, CALIF.

C. E. NIEHOFF & CO.

232 W. SUPERIOR ST. • CHICAGO, ILLINOIS



The new Newtype wire-cable-tape catalog, now being distributed by P & D Mfg. Co., Long Island City, N. Y., lists and describes the complete lines of Newtype ignition cable, Nokrode and Universal battery cables, wiring assemblies, wire, terminals and accessories and Newtype friction tape.

The Accurate Parts Mfg. Co., 12435 Euclid Ave., Cleveland, Ohio, has published under the caption "Three Out Of Five," a folder giving a clear, concise outline of the clutch repair business showing its importance;

(*Continued on page 68*)

There Is This Difference Between The TIMKEN Bearing And Other Tapered Roller Bearings

The TIMKEN Bearing is manufactured by The Timken Roller Bearing Company, Canton, Ohio; one of the world's most famous engineering-manufacturing organizations.

It is identified by the trade-mark "TIMKEN" stamped on the cup and cone.

It is made in one of the world's largest and best-equipped bearing plants.

It has 40 years of continuous engineering development and experience behind it.

It is made of TIMKEN Electric Furnace Alloy Steel—the finest material ever developed for tapered roller bearings—produced in the company's own steel plant.

It is manufactured to the highest standards of quality and precision ever established for bearing production.

TIMKEN Bearings need no pioneering. They have been used and advertised the world over for nearly 40 years.

In the light of these facts no automobile or truck owner should be satisfied to have a TIMKEN Bearing replaced with anything but another TIMKEN Bearing.

THE TIMKEN ROLLER BEARING COMPANY, CANTON, OHIO
Service-sales Division

Manufacturers of TIMKEN Tapered Roller Bearings for automobiles, motor trucks, railroad cars and locomotives and all kinds of industrial machinery; TIMKEN Alloy Steels and Carbon and Alloy Seamless Tubing; TIMKEN Rock Bits; and TIMKEN Fuel Injection Equipment.

TIMKEN
TAPERED ROLLER BEARINGS

Studebaker

(*Continued from page 17*)

ing much easier and clashing impossible.

The automatic hill-holder is continued as standard equipment.

Outstanding feature is the new solenoid-controlled overdrive which is optional equipment. Distinctive feature of its operation is that while the unit will cut in at around 30 miles per hour, the driver can change from overdrive to conventional at will above this speed, thus providing safe and powerful acceleration when needed. Free-wheeling continues at speeds below this range while conventional operation may be had, at will, by pulling the dash control.

Operation of the overdrive is simple, as may be gathered from the following brief description: To make the shift from overdrive to conventional at speeds above 30 miles per hour, the driver simply depresses the foot accelerator beyond the wide open throttle position. By solenoid control, the change is made from overdrive to conventional gear ratio. If the accelerator pedal is released, overdrive engagement is made automatically and the accelerator must again be depressed beyond wide open throttle to change to conventional gear ratio.

Movement of the accelerator pedal beyond the wide open throttle position closes a switch which operates the solenoid through a relay. The solenoid first closes a switch for an instant, a fiftieth of a second, and cuts off the ignition, thus relieving the torque load through the transmission train and permitting the solenoid to disengage a pawl in the sun gear. Disengagement of this pawl releases the overdrive and makes conventional ratio available.

Transmission remote control is operated by a control lever located conveniently on the steering post. Lever positions for the various ratios are the same as with the conventional arrangements except that the "H" has been turned on its side.

The Studebaker fresh air ventilating system, an exclusive feature, is optional, although all production bodies are built to receive the unit. The compact mechanism is housed in the front floor pan under the left side of the front seat, in the position formerly occupied by the battery which has been moved under the hood.

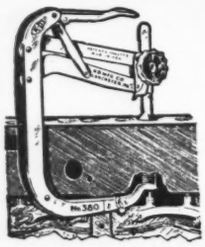
The mechanism consists of a high capacity, heating, air filtering, and ventilating unit which draws all of its air through a duct communicating with large openings in the body sill panel immediately over the running boards. Air drawn through the duct first passes through a filter to remove dust, then through the core of an efficient heater. The fresh, heated and filtered air then is discharged from beneath the front seat where it is distributed into the front and rear compartments at floor level.

On the engines, heat-dam aluminum alloy pistons with Ferrox treated compression rings are standard. High-output, shunt wound generators with voltage and current regulation are found on both models. Output is 29 amp. on the President, 28 amp. on the Commander. Batteries are 15-plate, 95-amp. hr. capacity on both models, mounted under the hood.

K-D TOOLS

are speed leaders

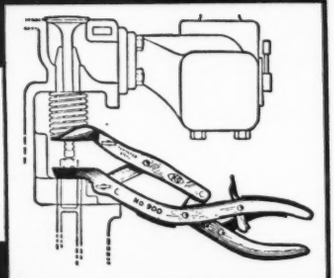
AND WHEN IT COMES TO VALVE LIFTERS....



K-D 380 FOR GENERAL SHOP USE

is hard to beat. Strong, versatile, easy to operate. Two sets of adjustable jaws . . . positive over-center lock . . . quick setting hand wheel. Only $8.10 List.

K-D 900 "HI-OFFSET," for the newer motors. For fast operation and clear view of valves when working under fenders, the 900's the thing. Auxiliary jaws for extra high lift. Only $2.00 List.



K-D VALVE GUIDE PULLER SETS

for Ford Motors. Pull valve assemblies no matter how tight the guides are stuck! Specially designed, drop-forged screw Pullers which pull directly on the guides . . . straight up! The correct principle. No. 920 Set (Ford 85HP and Lincoln-Zephyr) only $10.00 List. No. 860 Set (Ford 60 HP) only $9.50 List.

K-D 600 FOR GENERAL SHOP USE

An old favorite with thousands of users. Hardened, adjustable jaws, positive ratchet lock. Only $2.50 List.

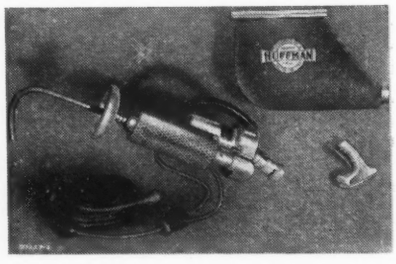
ASK YOUR JOBBER FOR DEALERS NET PRICES

K-D MANUFACTURING CO.

Lancaster, Pa.

Combination Heat Gun and Vacuum Cleaner

The latest product of the Huffman Mfg. Co., Davis & Gilbert Ave., Dayton, Ohio, is a combination heat gun and vacuum cleaner. As a heat gun it is claimed to generate 450 deg. of heat at the nozzle and an air volume



of six cubic feet per minute. Can be used for thawing differential and transmission grease, water hose, radiators and steering gears and for drying off spark plugs, distributors and ignition cables. It can be quickly converted for vacuum cleaner use to clean out the interior of the car. Complete information and prices may be obtained from the manufacturer.

Simple Arithmetic for Service Departments

Good job + speedier service =

Customer satisfaction + Profit

DeVilbiss can help you put that formula to work!

It's the *plus* in service that puts the *plus* in profit. And DeVilbiss Service Equipment can help *you* get *both* on every job—by giving better service *plus* faster service.

DeVilbiss Equipment can do a more thorough job for you because of its proven efficiency in operation. Satisfied customers and steady business result. Its improved design cuts the time required for each job—reducing costs—clearing the way for other jobs. Because of quality of manufacture and rugged construction, DeVilbiss Service Equipment easily withstands years of the roughest usage—lowering replacement and upkeep costs.

This formula is working out profitably for thousands of DeVilbiss users. Equip yourself to get this *plus* profit. Get DeVilbiss Service Equipment. Call your local DeVilbiss distributor today. The DeVilbiss Company, 318 Phillips Avenue, Toledo, Ohio.

YOU NEED THIS DEVILBISS EQUIPMENT

SPRAY GUNS—DeVilbiss offers you a wide variety of types for the efficient application of all finishing materials.

AIR COMPRESSORS—There is a dependable DeVilbiss Compressor of a size and type for any service requirement.

HOSE AND CONNECTIONS—Many different styles specially designed by DeVilbiss for handling air, water, oil, gasoline and all painting materials.

OIL GUNS—Many efficient designs for fast, thorough lubrication of springs, shackles, other chassis parts, body connections and fender seams.

DEVILBISS SPRAY SYSTEMS

1888 · FIFTY YEARS OF QUALITY PRODUCTS · 1938

Robert's Title

(*Continued from page 33*)

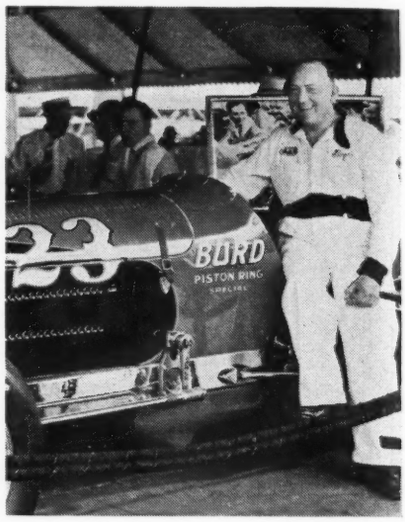
ond at Syracuse landed him in thirteenth place when he failed to add higher than the 188.1 points allowed Harry McQuinn for seventh at Indianapolis and the 175 allowed Frank Wearne for tenth in the "500."

With Roosevelt Raceway having thrown in the sponge this year, the point earners were fewer for the season. The 1937 title standing—based on points at Indianapolis, the Raceway, and Syracuse—listed 33 drivers. Only 21 will gain preference in numbers carried on their cars for 1939, based on the position earned in the 1938 title rating.

In recognition of his achievement, Roberts will receive a diamond-studded gold medal next year prior to the start of the 500-Mile International Sweepstakes at Indianapolis. Wilbur Shaw will be given a medal of similar design for second place and Miller will receive the third place medal. The medals become the permanent property of the recipients.

Although Roberts becomes the thirtieth champion in the sport's history which dates back to 1909, he will receive the twenty-third medal awarded by the AAA.

The governing board presented the first title medal in 1916 when Dario Resta retained the point margin he gained in his victory at Indianapolis. Although Bert Dingley, the first champion, was given the nod in 1909—two years before Indianapolis opened its brick speed course—applause was his only award.



Floyd Roberts and the Burd Piston Ring Special with which he won the 1938 Indianapolis race have been feature attractions for state fair visitors throughout the Midwest. Appearing in exhibits of Allis-Chalmers tractors, his "spiel" on the how-and-why of race car construction has attracted thousands of spectators.

Because of the six repeaters on the honor roll of champions, Roberts becomes the twenty-fourth driver to wear the mythical crown. Earl Cooper and Lou Meyer lead the consistent champions. Cooper gained the title in 1913, 1915 and 1917. Meyer rose to the throne in 1928, 1929 and 1933, and narrowly missed becoming the only four-time title holder in 1936. Although he won the Indianapolis "500" that year, Mauri Rose gained sufficient points in other championship classics to out-tally Meyer.

Other repeaters on the title roster are: Ralph Mulford, 1911 and 1918; Ralph DePalma, 1912 and 1914; Jimmy Murphy, 1922 and 1924, and Pete DePaolo, 1925 and 1927.

General Motors Patents Rear-Engine System

General Motors Corp. has patented a system for rear-engine operation of automobiles.

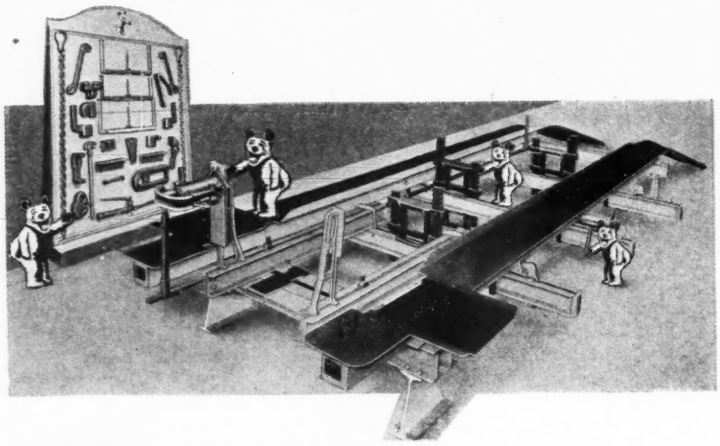
Although none of the manufacturers of popular types of automobiles has indicated any early intention of marketing a rear-engined machine, Henry Ford also obtained recent patents for such a vehicle.

The General Motors devices, invented by Eric Olle Schjolin, of Pontiac, would connect the conventional clutch pedal and gear-shifting lever with the rear engine by means of metal ribbons.

The patent indicated that the device was designed to be used in connection with a conventional automobile engine. However, the engine block and the housing of the rear axle would be in one piece, it was believed.

STRAIGHTEN FRAMES
WITHOUT REMOVING BODY,* FENDERS, RUNNING BOARDS!

IT'S A ONE MAN —BIG PROFIT OPERATION WITH THE NEW



BEAR HYDRAULIC FRAME STRAIGHTENER

You make MORE MONEY on frame straightening jobs when you use the Bear Frame Straightener No. 90. Here's why. The Bear No. 90 is an entirely *different* type of frame straightener! It SIMPLIFIES frame staightening. Never before has frame straightening been made so easy and quick.* Rarely if ever, need any part of the car body be removed! It eliminates all guesswork, thus insuring work that measures up to car manufacturers' original specifications!

And the machine STANDS UP! It's built like a battleship to take any kind of punishing use! Upkeep expense is practically unknown!

TWO MODELS. Standard—for shops catering to passenger cars and light trucks. Heavy-Duty—for trucks and busses.

For complete information see your Jobber or address the Bear Mfg. Co., Rock Island, Illinois. In Canada, address The Bear Equipment Services, Ltd., 44 Gerrard St., Toronto, Ont., Canada.

PROOF OF PROFITS

Don't let the can't-afford-it-now fear fool you out of Big Profits. Let us show you the big money which thousands of shops are making with this equipment. What they can do, you can do. Let us show you How!

GET IN TOUCH WITH AUTO-LITE!

Dealers Everywhere Report Spark Plug Sales Move Right Up When Auto-Lites Move In!

In 1938 more than twice as many people as in 1937 replaced their old spark plugs with a new and better kind—Auto-Lite. Auto-Lite sales for replacement during this past year of tough going and slack business are *up more than 100%!*

Auto-Lite spark plugs had to be right, they had to produce a new kind of spark plug performance, to get the kind of reception they've had from the automotive trade and motorcar owners all over America!

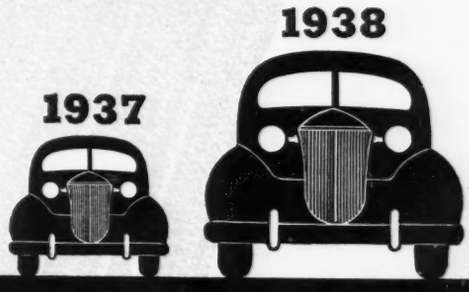
But a good product isn't the only reason. These spark plugs have a program of advertising and merchandising behind them that really builds them up with thirty million motorists. One Auto-Lite dealer after another writes that car owners they've never seen before drive in and order a set of Auto-Lites installed.

Auto-Lite advertising and Parade of Stars merchandising is the bright spot in the spark plug industry. It lives! It talks performance in understandable language! It piles up evidence of Auto-Lite superiority!

And it paves the way for sales by *introducing to the car owner* the Auto-Lite dealer in his community!

Auto-Lite is on the move. Get ready for a bigger push in 1939. *Get in touch with Auto-Lite!*

The Electric Auto-Lite Co., *Merchandising Div.*, Toledo, Ohio



STANDARD EQUIPMENT

THESE MANUFACTURERS NOW INSTALL AUTO-LITE SPARK PLUGS AS STANDARD FACTORY EQUIPMENT

MOTORCARS

CHRYSLER
DE SOTO
DODGE
NASH (Lafayette)
PLYMOUTH (De Luxe)
AMERICAN BANTAM

TRUCKS

BIEDERMAN
DIAMOND T
DODGE
GARFORD
GOTFREDSON
GRAMM
NELSON-LeMOON
PLYMOUTH (Commercial)

TRACTORS

LINN
MASSEY-HARRIS
PERU

ENGINES

CHRYSLER (Industrial)
STAR MARINE

AUTO-LITE SPARK PLUGS

Mechanical Specifications

These Specifications Are Brought Up-to-Date Each Month by the

Line Number	MAKE AND MODEL	Lowest Priced 4-d. Sed. (Dlvd.)	Wheelbase (In.)	Tire Size (In.)	ENGINE: No. of Cylinders, Bore and Stroke	Taxable Hp.	Piston Displacement (Cu. In.)	Maximum Brake HP. at Specified R.P.M.	Compression Ratio (to—1.)	Displacement Factor §	Cylinder Head Material	Camshaft Drive Make	Piston Material	Oil Cleaner Make	Air Cleaner Make	Carburetor Make	Muffler Make	Electrical System Make	Battery Make	CHASSIS: Clutch Type and Make	Gearset Make	Universals Type and Make	Rear Axle Type and Make	Rear Axle Ratio	Front Spring Suspension
1	Bantam.....60	439	75	5.00/15	4-2.2x3.0	7.75	45.6	20-4000	7.00	....	Al	Gear	Als	No	No	Til	Buf	AL	Wil	P.Ro	WG	Nb-UP	½ Spi	5.87	Tr
2	Buick.....39-40	.....	120	6.50/16	8-3 3/32 x4 1/2	30.6	248.0	107-3400	6.15	....	CI	LB	Al	No	AC	Car	Wal	DR	Del	P.Own	Own	Rb-Mec	½ Own	4.44	IC
3	Buick.....39-60	.....	126	7.00/15	8-3 1/16 x4 1/4	37.8	320.2	141-3600	6.25	....	CI	LB	Al	No	AC	Str	Wal	DR	Del	P.Own	Own	Rb-Mec	½ Own	3.90	IC
4	Buick.....39-80	.....	133	7.00/16	8-3 1/16 x4 1/4	37.8	320.2	141-3600	6.25	....	CI	LB	Al	No	AC	Str	Wal	DR	Del	P.Own	Own	m-Spi	½ Own	4.18	IC
5	Buick.....39-90	.....	140	7.50/16	8-3 1/16 x4 1/4	37.8	320.2	141-3600	6.25	....	CI	LB	Al	No	AC	Str	Wal	DR	Del	P.Own	Own	m-Spi	½ Own	4.55	IC
6	CadillacV8-38-60-60S	2085	127	7.00/16	8-3½x4½	39.2	346.0	135-3400	6.25	....	CI	Mor	Ala	No	AC	Str	Wal	DR	Del	P.Long	Own	Nb-Mec	½ Own	3.92	IC
7	Cadillac....V8-38-65	2285	132	7.50/16	8-3½x4½	39.2	346.0	135-3400	6.25	42.8	CI	Mor	Ala	No	AC	Str	Wal	DR	Del	P.Long	Own	Nb-Mec	½ Own	4.58	IC
8	Cadillac....V8-38-75	3075	141	7.50/16	8-3½x4½	39.2	346.0	140-3400	6.70	39.7	CI	Mor	Ala	No	AC	Str	Wal	DR	Del	P.Long	Own	Nb-Mec	½ Own	4.58	IC
9	Cadillac-V-16...38-90	5135	141	7.50/16	16-3¼x3¼	67.6	431.0	185-3600	6.80	....	CI	Mor	Ala	Fram	AC	Car	Wal	DR	Del	P.Long	Own	Nb-Mec	½ Own	4.31	IC
10	Chevrolet.HB Master	730	112¼	6.00/16	6-3½x3¾	29.4	216.5	85-3200	6.25	35.7	CI	Own	CI	No	AC	Car	Own	DR	D	P.Own	Own	m-Own	½ Own	3.72	C
11	Chevrolet...HA DeL.	796	112¼	6.00/16	6-3½x3¾	29.4	216.5	85-3200	6.25	39.7	CI	Own	CI	No	AC	Car	Own	DR	D	P.Own	Own	m-Own	½ Own	4.22	IC
12	Chrysler...Roy. C-18	998	119	6.25/16	6-3⅛x4½	27.3	241.5	95-3600	6.20	....	CI°	Mor	Ala	Pur	BA	Car	NS	AL	Wil	P.B&B	Own	Nb-UP	½ Own	4.10	IC
13	Chrysler...Imp. C-19	1198	125	6.50/16	8-3¼x4½	33.8	298.6	110-3400	6.20	....	CI°	M-W	Ala	Pur	AC	Str	NS	AL	Wil	P.B&B	WG	Nb-UP	½ Own	3.91	IC
14	Chrysler.Cus.Im.C-20	2295	144	7.50/16	8-3¼x4⅞	33.8	323.5	130-3400	6.50	....	Al	M-W	Ala	Pur	AC	Str	NS	AL	Wil	P.B&B	WG	Nb-UP	½ Own	4.35	IC
15	De Soto.....S-6	.....	119	6.00/16	6-3⅛x4¼	27.3	228.1	93-3600	6.50	....	CI°	Mor	Ala	Pur	AC	Car	.....	AL	Wil	P.B&B	Own	Nb-UP	½ Own	4.10	IC
16	Dodge.....Six	898	115	6.00/16	6-3¼x4⅜	25.3	217.8	87-3600	6.50	38.0	CI	Mor	Als	Pur	AC	Str	.....	AL	Wil	P.B&B	Own	Nb-UP	½ Own	4.10	C
17	Ford.....V8-60	685‡	112	5.50/16	8-2.6x3.2	21.6	136.0	60-4200	6.60	30.0	Al	Gear	CS	No	Yes	Str	Own	O	Own	P.....	Own	m-Spi	¾ Own	4.44	Tr
18	Ford.....V8-85	710‡	112	6.00/16	8-3 1/16 x3¾	30.0	221.0	85-3800	6.12	37.5	Al	Gear	CS	No	Yes	Str	Own	O	Own	P.Os	Own	m-Spi	¾ Own	3.78	Tr
19	Graham...Std., Spec.	1025	120	6.00/16	6-3¼x4⅜	25.3	217.8	90-3600	6.70	35.3	Al	LB	Als	No	Bur	Mar	Old	DR	Wil	P.Long	WG	Nb-UP	½ Spi	4.27	C
20	Graham.S.c.,Cus.S.C.	1198	120	(h)	6-3¼x4⅜	25.3	217.8	116-4000	6.70	....	Al	LB	Als	Fram	Bur	Mar	Old	DR	Wil	P.Long	WG	Nb-UP	½ Spi	4.27	C
21	Hudson 112.....89	755	112	5.50/16	6-3x4⅛	21.6	175.0	83-4000	6.50	....	CI	GED	Al	No	Bur	Car	Old	AL	Nat	P.Own	Own	Nb-Spi	½ Own	4.11	C
22	Hudson-Terrapl...81	864	117	6.00/16	6-3x5	21.6	212.0	96-3900	6.25	36.0	CI	GED	Al	No	AC	Car	Old	AL	Nat	P.Own	Own	Nb-Spi	½ Own	4.11	C
23	Hudson-Terrapl...82	915	117	6.00/16	6-3x5	21.6	212.0	101-4000	6.25	37.5	CI	GED	Al	No	AC	Car	Old	AL	Nat	P.Own	Own	Nb-Spi	½ Own	4.11	C
24	Hudson, 6 83	984	122	6.00/16	6-3x5	21.6	212.0	101-4000	6.25	36.7	CI	GED	Al	No	AC	Car	Old	AL	Nat	P.Own	Own	Nb-Spi	½ Own	4.11	C
25	Hudson 8,...84, 5, 7	1060	122, 129	6.50/16	8-3x4½	28.8	254.5	122-4200	6.25	41.2	CI	GED	Al	No	AC	Car	Old	AL	Nat	P.Own	Own	Nb-Spi	½ Own	4.11	C
26	Hupmobile Six.....	.....	122	6.25/16	6-3½x4¼	29.4	245.3	101-3600	5.75	42.2	CI	Mor	Als	No	AC	Car	Old	AL	Wil	P.B&B	WG	Nb-Spi	½ Spi	4.54	C
27	Hupmobile Eight.....	.....	125	6.50/16	8-3⅛x4¾	32.5	303.2	125-3500	5.80	44.5	CI	Mor	Als	No	AC	Car	Old	AL	Wil	P.Long	WG	Nb-UP	½ Spi	4.54	C
28	La Salle....V8, 38-50	1385	124	7.00/16	8-3⅜x4½	36.4	322.0	125-3400	6.25	40.7	CI	Mor	Ala	No	AC	Car	Wal	DR	Del	P.Long	Own	Nb-Mec	½ Own	3.92	IC
29	Lincoln.....V12	(i)‡	136-145	7.50/17	12-3½x4½	46.8	414.0	150-3400	6.38	34.3	Al	Ch	Al	Pur	AC	Str	Own	AL	Exi	P.Long	Own	m-Spi	FF Tim	4.58	C
30	Lincoln-Zephyr.....	1375‡	125	7.00/16	12-2¾x3¾	36.3	267.0	110-3900	6.70	40.8	Al	Gear	CS	Fram	....	CG	Own	O	Own	P.....	Own	m-Spi	¾ Own	4.44	Tr
31	Nash Lafay....3810	850	117	6.00/16	6-3⅜x4⅜	27.3	234.8	95-3400	5.83	38.4	CI	Whit	Als	No	AC	Str	Wal	AL	USL	P.B&B	Own	Nb-Mec	½ Own	4.11	C
32	Nash...Amb. 6, 3820	1050	121	6.25/16	6-3⅜x4⅜	27.3	234.8	105-3400	6.00	35.5	CI	Whit	Als	BS	AC	Mar	Wal	AL	USL	P.B&B	Own	Nb-Mec	½ Own	4.11	C
33	Nash...Amb. 8, 3880	1200	125	7.00/16	8-3½x4¼	31.2	260.8	115-3400	6.00	35.0	CI	Dia	Als	BS	Bur	Str	Wal	AL	USL	P.B&B	Own	Nb-Mec	½ Own	4.10	C
34	Oldsmobile.....F-38	967	117	6.50/16	6-3 7/16 x4⅛	28.4	229.7	95-3400	6.10	38.4	CI	Whit	Ala	No	AC	Car	Var	DR	D	P.B&B	Own	Nb-Mec	½ Own	4.37	IC
35	Olsdmobile.....L-38	1078	124	7.00/16	8-3¼x3 7/8	33.8	257.1	110-3600	6.20	41.7	CI	LB	Ala	No	AC	Car	Var	DR	D	P.B&B	Own	Nb-Mec	½ Own	4.37	IC
36	Packard Six....1700	.....	122	6.50/16	6-3½x4¼	29.4	245.3	100-3200	6.52	....	CI	Mor	Als	Pur	Op	CG	.....	DR	Wil	P.....	Own	Nb-Mec	½ Own	4.54	IC
37	Packard Eight.1701-2	.....	127, 148	7.00/16	8-3¼x4¼	33.8	282.0	120-3600	6.41	....	CI	Mor	Als	Pur	AC	Str	.....	AL	PD	P.....	Own	Nb-Mec	½ Own	(b)	IC
38	Pack. Sup. 8...1703-5	.....	127, 148	7.00/16	8-3⅜x5	32.5	320.0	120-3200	6.45	....	CI	Mor	Als	Pur	AC	Str	.....	AL †	PD	P.....	Own	Nb-Mec	½ Own	(s)	IC
39	Pack. Twelve..1707-8	.....	134, 39	8.25/16	12-3 7/16 x4¼	56.7	473.0	175-3200	6.30	....	Al	Mor	Als	Pur	AC	Str	.....	AL †	PD	P.....	Own	Nb-Spi	½ Own	4.41	IC
40	Plymouth.....P7	.....	114	5.50/16	6-3 1/16 x4⅜	23.4	201.3	82-3600	6.70	....	CI°	Mor	Ala	No	....	Car	.....	AL	Wil	P.....	Own	.....	½ Own	3.90	IC
41	Plymouth.....P8	.....	114	6.00/16	6-3½x4⅜	23.4	201.3	82-3600	6.70	....	CI°	Mor	Ala	Pur	....	Car	.....	AL	Wil	P.....	Own	.....	½ Own	4.10	IC
42	Pontiac 6.....39-25	.....	115	6.00/16	6-3 7/16 x4	28.3	222.7	85-3520	6.20	....	CI	Mor	CHI	No	AC	Car	Var	DR	Del	P.In	Own	Rb-Mec	½ Own	4.10	IC
43	Pontiac 6.....39-26	.....	120	6.00/16	6-3 7/16 x4	28.3	222.7	85-3520	6.20	....	CI	Mor	CHI	No	AC	Car	Var	DR	Del	P.In	Own	Rb-Mec	½ Own	4.10	IC
44	Pontiac 8.....39-28	.....	120	6.00/16	8-3¼x3¾	33.8	248.9	100-3700	6.20	....	CI	Mor	CHI	No	AC	Car	Var	DR	Del	P.In	Own	Rb-Mec	½ Own	4.30	IC
45	Studebaker..Com. 9A	.....	116½	6.00/16	6-3 1/16 x4⅜	26.3	226.0	90-3400	6.00	....	CI	Dia	Ly	Fram	AC	Str	Buf	AL	Wil	P.B&B	WG	Nb-Spi	½ Spi	4.55	IT
46	Studebaker..Pres. 5C	.....	122	6.50/16	8-3 1/16 x4¼	30.0	250.4	110-3600	6.00	....	CI	Dia	Ly	Fram	AC	Str	Bur	DR	Wil	P.In	WG	Nb-Spi	½ Spi	4.55	IT
47	Willys.....38	563‡	100	5.50/16	4-3⅛x4⅜	15.6	134.2	48-3200	5.70	31.6	CI°	LB	CI	F-O	AC	Til	Buf	AL	USL	P.R-B	WG	m-UP	½ Own	4.30	C

ABBREVIATIONS—General

°—Others also
•—Measured on rim of Flywheel
½—Semi-floating
¾—Three-quarter floating
††—With clearance of .015 the valve is .004 off its seat.
‡—Does not include Federal Taxes
§—Computed on basis of displacement, gear ratio, effective tire diameter, and weight with normal load.

(a)—(−¼ to +¾)
A—Above (rods removed from)
A—After top center
AA—Automatic adjuster
Ad—Advanced
Al—Aluminum
Ala—Aluminum, Anode processed
Als—Aluminum with struts
Au—Automatic
(b)—4.36-1701; 4.70-1702
B—Below (rods removed from)
B—Before top center
Bm—Before marks on vibration damper
(c)—1−⅛, 1−3/32
C—Conventional
C—Cold (Tappet clearance)
Ch—Chain
CHI—Chrome Nickel Iron
CI—Cast Iron **CS**—Cast Steel
CSM—Chain sproket markings
(d)—0+0−½ (e)—0+1/16−0
(f)—1/16±1/16−0
F—Floating (Piston Pin)
FF—Full floating
(g)—138 in -7.00/17; 147 in.-7.50/17
(h)—6.25/16 on standard, 6.50/16 on Custom.
H—Hot (tappet clearanec)
(i)—4900-5100 **IC**—Independent coil
IT—Independent Transverse
(k)—Intake .0125; Exhaust .0156
Ly—Lynite **m**—Metal
M—Mechanical **N**—Negative
(n)—Intake .0124; Exhaust .0156
Nb—Needle bearing
P—Piston (Pin Locked in)
P—Single plate clutch
PH—Power operated, hydraulic brakes
R—Rod (Pin locked in)
(r)—Out only **Ru**—Rubber
Rb—Roller Bearing
(s)—4.36-1703, 4.54-1705
(t)—½±¾−0 **TC**—Top Center
Tr—Transverse **Var**—Various
x—At 1000 R.P.M.
y—At 2800 R.P.M.

Tune-Up Specifications

Car Manufacturers and Supersede All Others Previously Published

Service Brake Make and Type	Steering Gear Make	Compression Pressure at Cranking Speed (Lbs.)	Spark Plug Make and Type	RINGS No. and Width Comp.	RINGS No. and Width Oil	Piston Pin Diameter	Piston Pin Locked In	VALVES Head Diameter and Seat Angle Inlet (Ins.)	Inlet Seat Angle (Degrees)	Exhaust (Ins.)	Exhaust Seat Angle (Degrees)	Stem Diameter (Ins.)	Operating Tappet Clearance Inlet	Operating Tappet Clearance Exhaust	Inlet Tappet Clearance for Valve Timing	Intake Valve Opens Before or After T.C. No. of Degrees	No. of Flywheel Teeth	IGNITION Breaker Points Gap (Ins.)	Spark Plug Gap (Ins.)	Timing Spark Occurs °TC	Timing No. of Flyw. Teeth Spark Occurs TC	Breaker Housing	Rods Removed From	Crankpin Diameter (Ins.)	Crankpin Length (Ins.)	Capacity Crankcase (Qts.)	Capacity Cooling System (Qts.)	FRONT AXLE Caster (Degrees)	Camber (Degrees)	Toe-In (Inches)	King Pin Inclination (Degrees)	Line Number
OM	La	90	AL-A9	2–$\frac{3}{32}$	1–$\frac{1}{8}$	$\frac{39}{64}$	R	1$\frac{1}{32}$	30	1$\frac{1}{32}$	30	.279	.006	.006	.006	19B	4½B	.022	.025	2½B	1B	Au	A	1$\frac{5}{16}$	1¼	1½	7	5	½	0° 9′	1½	1
OH	S	112	AC-46	2(c)	2–$\frac{3}{16}$	1$\frac{13}{16}$	R	1$\frac{17}{32}$	45	1$\frac{13}{32}$	45	.372	.015H	.015H	††	13B	5¼B	.015	.025	4B	1½B	Au	A	2	1.21	6	13¼	N$\frac{1}{2}$ ± $\frac{3}{4}$	–¼, +1	0–$\frac{1}{16}$	3½–4½	2
OH	S	114	AC-46	2(c)	2–$\frac{3}{16}$	1$\frac{13}{16}$	R	1$\frac{17}{32}$	45	1$\frac{13}{32}$	45	.372	.015H	.015H	††	14B	6B	.015	.025	6B	2½B	Au	A	2¼	1.31	8	17	N$\frac{1}{2}$ ± $\frac{3}{4}$	–¼, +1	0–$\frac{1}{16}$	3½–4½	3
OH	S	114	AC-46	2(c)	2–$\frac{3}{16}$	1$\frac{13}{16}$	R	1$\frac{17}{32}$	45	1$\frac{13}{32}$	45	.372	.015H	.015H	††	14B	6B	.015	.025	6B	2½B	Au	A	2¼	1.31	8	17	N$\frac{1}{2}$ ± $\frac{3}{4}$	–¼, +1	0–$\frac{1}{16}$	4½–5½	4
OH	S	114	AC-46	2(c)	2–$\frac{3}{16}$	1$\frac{13}{16}$	R	1$\frac{17}{32}$	45	1$\frac{13}{32}$	45	.372	.015H	.015H	††	14B	6B	.015	.025	6B	2½B	Au	A	2¼	1.31	8	17	N$\frac{1}{2}$ ± $\frac{3}{4}$	–¼, +1	0–$\frac{1}{16}$	4–5	5
BH	S	155	AC-45	2–$\frac{1}{8}$	2–$\frac{5}{32}$	$\frac{7}{8}$	F	1.88	45	1.63	45	.341	AA	AA	AA	TC	TC	.015	.027	5B	2¼B	Au	A	2.46	2$\frac{1}{32}$	7	24	N3¼–0	¼–1	$\frac{1}{32}$–$\frac{3}{32}$	5° 44′	6
BH	S	155	AC-45	2–$\frac{1}{8}$	2–$\frac{5}{32}$	$\frac{7}{8}$	F	1.88	45	1.63	45	.341	AA	AA	AA	TC	TC	.015	.027	5B	2¼B	Au	A	2.46	2$\frac{1}{32}$	7	25	0–± ¼	0–½	$\frac{1}{32}$–$\frac{3}{32}$	5° 31′	7
BH	S	170	AC-45	2–$\frac{1}{8}$	2–$\frac{5}{32}$	$\frac{7}{8}$	F	1.88	45	1.63	45	.341	AA	AA	AA	TC	TC	.015	.027	5B	2¼B	Au	A	2.46	2$\frac{1}{32}$	7	25	0–± ¼	0–½	$\frac{1}{32}$–$\frac{3}{32}$	5° 31′	8
BH	S	180	AC-45	2(c)	1–$\frac{1}{16}$	$\frac{13}{16}$	R	1.50	45	1.37	45	.341	AA	AA	AA	8B	3½B	.015	.027	6B	2½B	Au	A	2	1¾	11	30	0–± ¼	0–½	$\frac{1}{32}$–$\frac{3}{32}$	5° 31′	9
OH	O	....	AC-46	2–$\frac{1}{8}$	1–$\frac{3}{16}$	.865	R	1$\frac{41}{64}$	30	1$\frac{13}{32}$	30	.340	.006H	.013H	.006	9B	3½B	.021	.040	5B	2B	Au	A	2$\frac{5}{16}$	1½	5	14	1¾–2¾	½–1½	$\frac{1}{16}$–$\frac{1}{8}$	7° 10′	10
OH	O	....	AC-46	2–$\frac{1}{8}$	1–$\frac{3}{16}$	.865	R	1$\frac{41}{64}$	30	1$\frac{13}{32}$	30	.340	.006H	.013H	.006	9B	3½B	.021	.040	5B	2B	Au	A	2$\frac{5}{16}$	1½	5	14	.....	.....	.....	.....	11
LH	G	145x	AL-A7	2–$\frac{1}{8}$	2–$\frac{5}{32}$	$\frac{55}{64}$	F	1$\frac{21}{32}$	45	1$\frac{17}{32}$	45	.340	.008H	.010H	.014	8B	3¼B	.020	.025	TC	TC	Au	A	2$\frac{1}{16}$	1$\frac{7}{32}$	5	17	½–2½	(a)	0–⅛	4¾–6	12
LH	G	145x	AL-A7	2–$\frac{1}{8}$	2–$\frac{5}{32}$	$\frac{55}{64}$	F	1$\frac{21}{32}$	45	1$\frac{17}{32}$	45	.340	.006H	.010H	.011	2B	¾B	.018	.025	3B	1¼B	Au	A	2$\frac{5}{16}$	1⅛	6	20	½–2½	(a)	0–⅛	4¾–6	13
LH	G	155x	AL-AL7	2–$\frac{1}{8}$	2–$\frac{5}{32}$	$\frac{55}{64}$	F	1$\frac{13}{32}$	45	1$\frac{13}{32}$	45	.340	.006H	.010H	.011	2B	¾B	.018	.025	TC	TC	Au	A	2$\frac{5}{16}$	1⅛	6	20	1–3	(a)	0–⅛	4¾–6	14
LH	G	145x	AL	2–$\frac{1}{8}$	2–$\frac{5}{32}$	$\frac{55}{64}$	F	1$\frac{21}{32}$	45	1$\frac{17}{32}$	45	.340	.008H	.010H	.014	8B	3¼B	.020	.025	TC	TC	Au	A	2$\frac{1}{16}$	1$\frac{7}{32}$	5	19	½–2½	(a)	0–⅛	4¾–6	15
LH	O	140x	AL-A7	2–$\frac{1}{8}$	2–$\frac{5}{32}$	$\frac{55}{64}$	F	1$\frac{13}{32}$	45	1$\frac{13}{32}$	45	.340	.006H	.008H	.011	6A	2½A	.020	.025	4A	1½A	Au	A	2$\frac{1}{16}$	1	5	15	1–3	¼–¾	0–⅛	4½–5½	16
OM	O	150y	Ch-H-10	2–$\frac{3}{32}$	1–$\frac{5}{32}$	.687	F	1.28	45	1.28	45	.279	.013C	.013C	.013	9½B	....	.015	.025	4B	....	Au	..	1.60	1.54	4	15.2	8	1	$\frac{1}{16}$–⅛	8	17
OM	O	100	Ch-7	2–$\frac{3}{32}$	1–$\frac{3}{32}$	.750	F	1$\frac{1}{32}$	45	1$\frac{1}{32}$	45	.310	.013C	.013C	.013	9½B	3B	.015	.025	4B	1¼B	Au	A	2	1$\frac{13}{16}$	5	22	8	1	$\frac{1}{16}$–⅛	8	18
OH	R	160x	Ch-J-9	2–$\frac{3}{32}$	1–$\frac{3}{16}$ 1–$\frac{5}{32}$ 1–$\frac{3}{32}$	$\frac{13}{16}$	R	1$\frac{23}{64}$	30	1$\frac{21}{64}$	45	$\frac{9}{16}$	.010H	.010H	.012	4½B	1½B	.018	.025	TC	TC	Au	A	2$\frac{1}{16}$	1$\frac{9}{16}$	5	13½	3–4	1	⅛–$\frac{3}{16}$	7½	19
OH	R	120	Ch-J-9	2–$\frac{3}{32}$	1–$\frac{3}{16}$ 1–$\frac{5}{32}$ 1–$\frac{3}{32}$	$\frac{13}{16}$	R	1$\frac{23}{64}$	30	1$\frac{21}{64}$	45	$\frac{9}{16}$	.010H	.010H	.012	4½B	1½B	.018	.025	4A	1½A	Au	A	2$\frac{1}{16}$	1$\frac{9}{16}$	5	13½	3–4	1	⅛–$\frac{3}{16}$	7½	20
HM	G	115	Ch-J-8-A	2–$\frac{3}{32}$	2–$\frac{3}{16}$	$\frac{3}{4}$	F	1$\frac{3}{8}$	45	1$\frac{3}{8}$	45	$\frac{11}{32}$	.006	.008	.010	10$\frac{2}{3}$B	4B	.020	.032	TC	TC	Au	A	1$\frac{13}{16}$	1$\frac{3}{8}$	4½	12½	2–3	1–1½	0–⅛	7	21
HM	G	120	Ch-J-8-A	2–$\frac{3}{32}$	2–$\frac{3}{16}$	$\frac{3}{4}$	F	1$\frac{3}{8}$	45	1$\frac{3}{8}$	45	$\frac{11}{32}$	.006	.008	.010	10$\frac{2}{3}$B	4B	.020	.032	TC	TC	Au	A	1$\frac{13}{16}$	1$\frac{3}{8}$	4½	12½	2–3	1–1½	0–⅛	7	22
HM	G	120	Ch-J-8-A	2–$\frac{3}{32}$	2–$\frac{3}{16}$	$\frac{3}{4}$	F	1$\frac{3}{8}$	45	1$\frac{3}{8}$	45	$\frac{11}{32}$	.006	.008	.010	10$\frac{2}{3}$B	4B	.020	.032	TC	TC	Au	A	1$\frac{13}{16}$	1$\frac{3}{8}$	4½	12½	2–3	1–1½	0–⅛	7	23
HM	G	120	Ch-J-8-A	2–$\frac{3}{32}$	2–$\frac{3}{16}$	$\frac{3}{4}$	F	1$\frac{3}{8}$	45	1$\frac{3}{8}$	45	$\frac{11}{32}$	.006	.008	.010	10$\frac{2}{3}$B	4B	.020	.032	TC	TC	Au	A	1$\frac{13}{16}$	1$\frac{3}{8}$	4½	12½	2–3	1–1½	0–⅛	7	24
HM	G	118	Ch-J-8-A	2–$\frac{3}{32}$	2–$\frac{3}{16}$	$\frac{3}{4}$	F	1½	45	1$\frac{3}{8}$	45	$\frac{11}{32}$	.006	.008	.010	10$\frac{2}{3}$B	4B	.017	.032	TC	TC	Au	A	1$\frac{13}{16}$	1$\frac{3}{8}$	7	17½	2–3	1–1½	0–⅛	7	25
H	G	107	Ch-7	2–$\frac{1}{8}$	2–$\frac{5}{32}$	$\frac{7}{8}$	F	1$\frac{21}{32}$	45	1$\frac{17}{32}$	45	.341	.010	.013	....	2B	¾B	.022	.027	7B	2¼B	Au	A	2$\frac{1}{16}$	1¼	6	18	1½	1	$\frac{1}{16}$–$\frac{3}{16}$	8½	26
H	G	113	Ch-7	2–$\frac{1}{8}$	2–$\frac{5}{32}$	$\frac{7}{8}$	F	1$\frac{17}{32}$	45	1$\frac{13}{32}$	45	.341	.006	.013	.010	1A	⅛A	.015	.027	7B	2B	Au	B	2¼	1¼	8	21.5	1½	1¼	$\frac{1}{16}$–$\frac{3}{16}$	8½	27
BH	S	155x	AC-45	2–$\frac{1}{8}$	2–$\frac{5}{32}$	$\frac{7}{8}$	F	1.88	45	1.63	45	.341	AA	AA	AA	TC	TC	.015	.027	5B	2¼B	Au	A	2$\frac{13}{32}$	2$\frac{1}{32}$	7	25	N3¼–0	¼–1	$\frac{1}{32}$–$\frac{3}{32}$	5° 44′	28
OM	O	105	Ch-7	2–$\frac{1}{8}$	2–$\frac{5}{32}$	$\frac{7}{8}$	F	1$\frac{11}{16}$	45	1$\frac{11}{16}$	45	$\frac{9}{16}$	AA	AA	AA	21B	6¾B	.020	.029	7B	2¼B	Au	B	2½	2	12	32	1½	1	$\frac{1}{16}$–⅛	7½	29
OM	O	105	Ch-H-10	2–$\frac{3}{32}$	1–$\frac{3}{32}$	$\frac{3}{4}$	F	1.54	45	1.54	45	.311	AA	AA	AA	19½B	6B	.015	.029	4B	1¼B	Au	A	2⅛	1.57	5	30	4	¾	$\frac{1}{16}$	4	30
BH	G	110	AL-B7	2–$\frac{1}{8}$	2–$\frac{5}{32}$	$\frac{7}{8}$	F	1$\frac{21}{32}$	45	1$\frac{17}{32}$	45	.340	.015	.015	.015	CSM	CSM	.020	.025	4A	.....	Au	A	2	1.42	6	20	1–2	0–1½	0–$\frac{1}{16}$	7	31
BH	G	125	AC-45	2–$\frac{1}{8}$	2–$\frac{5}{32}$	$\frac{7}{8}$	F	1$\frac{3}{4}$	45	1$\frac{19}{32}$	45	.372	.008H	.015H	.008	CSM	CSM	.020	.025	4B	1¼B	Au	A	2	1.42	7	20	1–2	0–1½	0–$\frac{1}{16}$	7	32
BH	G	125	AC-45	2–$\frac{1}{8}$	1–1$\frac{7}{8}$ 1–$\frac{5}{16}$	$\frac{7}{8}$	F	1$\frac{21}{32}$	45	1$\frac{19}{32}$	45	.375	.015H	.015H	.015	CSM	CSM	.020	.025	9B	2½B	Au	B	2	1.24	7	18	1–2	0–1½	0–$\frac{1}{16}$	7	33
BH	S	146x	AC-45	2–$\frac{1}{8}$	2–$\frac{3}{16}$	$\frac{55}{64}$	P	1$\frac{9}{16}$	30	1$\frac{27}{64}$	45	$\frac{11}{32}$	.008H	.011H	(k)	5B	2B	.020	.040	TC	TC	Au	A	2⅛	1⅜	6	17	0–N3¼	⅛–1	⅛–$\frac{1}{16}$	4° 51′	34
BH	S	152x	AC-45	2–$\frac{1}{8}$	2–$\frac{3}{16}$	$\frac{55}{64}$	P	1$\frac{9}{16}$	30	1$\frac{27}{64}$	45	$\frac{11}{32}$	.008H	.011H	(n)	TC	TC	.015	.030	2B	¾B	Au	A	2⅛	1⅜	7	21	0–N3¼	⅛–1	⅛–$\frac{1}{16}$	4° 51′	35
H	O	....	AC-103 (z)	2–$\frac{1}{8}$	1–$\frac{3}{16}$	$\frac{7}{8}$	F	1.57	30	1$\frac{13}{32}$	45	.340	.007H	.010H	.012	1B	½B	.020	.028	6B	2½B	Au	A	2$\frac{3}{32}$	1¼	5	15	1½±½	(t)	(e)	1° 54′	36
H	O	....	AC-103 (z)	2–$\frac{1}{8}$	1–$\frac{3}{16}$	$\frac{7}{8}$	F	1$\frac{17}{32}$	30	1$\frac{13}{32}$	45	.340	.007H	.010H	.012	1B	½B	.015	.028	8B	3B	Au	A	2$\frac{3}{32}$	1¼	6	16	1½±½	(t)	(e)	1° 54′	37
H	O	....	AC-103 (z)	2–$\frac{1}{8}$	2–$\frac{5}{32}$	$\frac{7}{8}$	F	1$\frac{21}{32}$	45	1$\frac{13}{32}$	45	.340	.006H	.008H	.005	26B	.....	.015	.028	7B	....	Au	B	2	1$\frac{5}{32}$	7½	22	0±½	(t)	(e)	1° 54′	38
BPH	O	....	AC-103 (z)	3–$\frac{1}{8}$	1–$\frac{5}{32}$	$\frac{7}{8}$	F	1$\frac{41}{64}$	45	1$\frac{13}{32}$	45	.340	AA	AA	....	TC	TC	.020	.028	6B	2B	Au	B	2½	1⅞	10	40	(d)	1±¼	(f)	1° 30′	39
LH	O	145x	.....	2–$\frac{1}{8}$	2–$\frac{5}{32}$	$\frac{55}{64}$	F	1$\frac{13}{32}$	45	1$\frac{13}{32}$	45	.340	.006H	.008H	.011	6A	2½A	.020	.025	.....	.....	Au	A	1$\frac{13}{16}$	1	5	14	–½ to +½	–½ to +½	0–⅛	5½–6½	40
LH	O	145x	.....	2–$\frac{1}{8}$	2–$\frac{5}{32}$	$\frac{55}{64}$	F	1$\frac{13}{32}$	45	1$\frac{13}{32}$	45	.340	.006H	.008H	.011	6A	2½A	.020	.025	.....	.....	Au	A	1$\frac{13}{16}$	1	5	14	–½ to +½	–½ to +½	0–⅛	5½–6½	41
BH	S	141x	AC-45	2–$\frac{3}{32}$	1–$\frac{3}{16}$	$\frac{15}{16}$	P	1$\frac{19}{32}$	30	1$\frac{15}{32}$	45	.310	.012H	.012H	.015	5B	.....	.021	.025	4B	.....	.....	A	2⅛	1$\frac{3}{32}$	6	16	N$\frac{3}{4}$–N1$\frac{1}{4}$	¾–1¼	0–$\frac{1}{16}$	4° 51′	42
BH	S	141x	AC-45	2–$\frac{3}{32}$	1–$\frac{3}{16}$	$\frac{15}{16}$	P	1$\frac{19}{32}$	30	1$\frac{15}{32}$	45	.310	.012H	.012H	.015	5B	2B	.021	.025	4B	.....	Au	A	2⅛	1$\frac{3}{32}$	6	16	N$\frac{3}{4}$–N1$\frac{1}{4}$	¾–1¼	0–$\frac{1}{16}$	4° 51′	43
BH	S	141x	AC-45	2–$\frac{3}{32}$	1–$\frac{3}{16}$	$\frac{15}{16}$	P	1$\frac{13}{32}$	30	1$\frac{11}{32}$	45	310	.012H	.012H	.015	5B	2B	.015	.025	4B	.....	Au	A	2	1$\frac{1}{16}$	7	19	N$\frac{3}{4}$–N1$\frac{1}{4}$	¾–1¼	0–$\frac{1}{16}$	4° 51′	44
LH	R	105	Ch-8	2–$\frac{1}{8}$	1–$\frac{3}{16}$	$\frac{7}{8}$	R	1$\frac{15}{32}$	45	1$\frac{9}{32}$	45	$\frac{11}{32}$	.016C	.016C	.020	15B	5½B	.020	.025	2B	¾B	Au	A	2⅜	1⅜	6	14½	N$\frac{1}{4}$–+$\frac{1}{2}$	½	1⅛–$\frac{3}{32}$	5½	45
LH	R	105	Ch-8	2–$\frac{1}{8}$	1–$\frac{3}{16}$	$\frac{7}{8}$	R	1$\frac{13}{32}$	45	1$\frac{9}{32}$	45	$\frac{11}{32}$	.016C	.016C	.020	15B	5½B	.020	.025	TC	TC	Au	A	1⅞	1$\frac{1}{16}$	8	17	N$\frac{1}{4}$–+$\frac{1}{2}$	½	⅛–$\frac{3}{32}$	5½	46
BM	G	87	Ch-C-7	3–$\frac{3}{32}$	1–$\frac{5}{16}$	$\frac{13}{16}$	F	1$\frac{1}{32}$	45	1$\frac{1}{32}$	45	.371	.004H	.006H	.010	TC	TC	.020	.025	5A	1½A	Au	A	1$\frac{13}{16}$	1$\frac{5}{16}$	4	11	3	2	$\frac{3}{32}$	7½	47

MAKES OF UNITS

†—Starter Motor—Owen-Dyneto
AC—AC Spark Plug Co.
AL—Auto-Lite
BC—Carter and Chandler-Groves
BA—Burgess or AC
B&B—Borg and Beck
BH—Buffalo or Hayes (mufflers)
BH—Bendix, Hydraulic
BM—Bendix, Mechanical
BO—Buffalo or Oldberg
BPH—Bendix, power operated, hydraulic **BS**—Briggs & Stratton
Buf—Buffalo Pressed Steel
Bur—Burgess **Car**—Carter
CG—Chandler-Groves
Ch—Champion **Del**—Delco
Dia—Continental Diamond Fiber
Det—Detroit **Exi**—Exide
DR—Delco-Remy
F-O—Float-O **G**—Gemmer
Ge—General Electric Co.
GED—General Electric or Continental Diamond Fibre
HM—Bendix hydraulic and mechanical combined
In—Inland **LB**—Link Belt
LH—Lockheed hydraulic
Ly—Lynite
Mar—Marvel **Mec**—Mechanics
Mor—Morse Chain Co.
M-W—Morse or Whitney
Nat—National
NS—Noblitt Sparks
O—Own **OH**—Own hydraulic
Old—Oldberg
OM—Own, mechanical
OP—Own, power operated
Op—Optional
Os—Own, semi-centrifugal
PD—Prest-O-Lite or Delco
Pur—Purolator **R**—Ross
R-B—Rockford with Borg & Beck disk **Rd**—Rockford
S—Saginaw
SC—Stromberg or Carter
SM—Stromberg or Marvel
Spl—Spicer **Ste**—Stewart-Warner
Str—Stromberg
Th—Thompson Products
UP—Universal Products
Wal—Walker
WG—Warner Gear
Whit—Whitney **Wil**—Willard
(z)—Or Champion **Y**—4

PARTS NUMBERS AND PRICES

Oldsmobile—Model F-38—6 Cylinder—1938

Front Suspension

Mfr's Part No.	No. Per Car	List Price Each
231861—Knuckle, L.	1	$7.00
231849—Knuckle support, L.	1	5.00
231843—King pin	2	.85
231905—King pin bush.	4	.15
230679—Pin thrust brg.	2	.50
230857—King pin lock pin	2	.15
231760—Upper arm pin	2	.50
500863—Pin bush., threaded	2	.35
1298827—Pin bushing, plain	2	.30
231995—Support arm, low., L. F., R. R.	2	3.50
231759—Low. arm pin, out.	2	.60
231983—Low. arm pin bush.	2	.50
231996—Low. arm in. shaft	2	1.75
231997—Inner shaft bush.	4	.35
409160—Main coil spring	2	5.00
231549—Tie rod	2	.95
231949—End assem., L.	2	2.85
231948—End assem., R.	2	2.85
231837—Knuckle arm, L.	1	1.80
1298664—Inter. steering arm	1	3.50
1300921—Inter. arm bush.	1	.25
1289122—Inter. arm bolt	1	.15
263532—Inter. arm ball	1	.25
409851—Front wheel, prime	2	9.50
408635—L. F. hub & drum	1	9.00
408637—Front brake drum	2	4.00
909032—Wheel bearing, in.	2	3.20
909025—Wheel bearing, out.	2	2.35
231901—Grease felt	2	.20
* 231177—Brake lining	1	3.00
231917—Backing plate, L.	1	2.50
499909—Hub bolt, L.	5	.10

Steering

263753—Drag link only	1	2.00
263696—Ball seat	4	.15
263757—Seat spring, L.	2	.10
335976—Seat spring, R.	1	.20
264396—Pitman arm	1	1.75
263532—Pitman arm ball	1	.25
263278—Cross shaft	1	6.50
263305—Cross shaft bush.	1	.30
263430—Gear housing	1	3.50
263470—Tube and worm	1	5.50
11BC—Worm bearing cone	2	.85
14CE—Worm bearing cup	2	1.05
263468—Jacket tube	1	1.80
262159—Jacket tube brg.	1	.70
753137—Steering wheel	1	6.00
*753109—Steering wheel, Del.	1	8.50

Cooling

3109107—Rad. core assem.	1	45.00
409610—Radiator grille	1	20.00
985127—Thermostat unit	1	1.00
408066—Water pump body	1	2.75
409076—Pump body cover	1	.30
408074—Pump impeller	1	.60
885140—Shaft and bearing	1	...
501427—Pump seal	1	.15
408062—Fan blades	1	1.00
409544—Fan hub	1	.90
408064—Fan belt	1	1.15

Fuel and Exhaust Systems

385S—Carburetor assem.	1	19.00
*388S—Carburetor assem.	1	20.00
170K-23S—Choke thermostat & housing, 385S	1	2.00
1523228—Fuel pump, exch.	1	2.50
1523227—Fuel & vac. pump, exch.	1	4.80
408054—Inlet manifold	1	4.75
408057—Exhaust manifold	1	7.50
408758—Muffler	1	3.75
408752—Tail pipe	1	1.75
408749—Exhaust pipe	1	1.65

Engine Gaskets

601348—Carb. to mani.	1	.05
408151—Fuel pump	1	.03
399321—Exh. pipe packing	1	.15
408196—Mani. to block, set	1	.25
408010—Cylinder head	1	1.00
408289—Oil pan	1	.25
408112—Main brg. seal	2	.10
407018—Timing case oil seal	1	.05
400229—Timing case cover	1	.12
408106—Valve side plate	2	.10
409081—Water outlet	1	.05
408078—Pump to cylinder	1	.03
408077—Water pump cover	1	.03

Engine Parts

408197—Block with pistons, pins and rings	1	122.00
408009—Cylinder head	1	12.00
408005—Oil pan	1	3.50
408026—Crankshaft	1	40.00
408085—Vibration damper	1	4.20
409007—Flywheel	1	7.75
403253—Flywheel gear	1	2.00

Engine Parts—continued

Mfr's Part No.	No. Per Car	List Price Each
408278—Piston & pin	6	$4.15
408140—Compression ring	12	.35
408141—Oil ring	12	.60
408083—Piston pin	6	.55
399078—Piston pin bushing	6	.12
408139—Pin set screw	6	.05
410027—Con. rod, less brgs.	6	2.75
408295—Con. rod brg., PR.	6	.90
405628—Inlet valve	6	.65
408192—Exhaust valve	6	1.00
408309—Valve spring	12	.25
403216—Valve spring seat	12	.05
403219—Valve key	24	.05
408314—Valve guide	12	.30
408097—Valve lifter only	12	.60
408098—Valve adj. screw	12	.10
408099—Adj. screw nut	12	.02
408013—Timing case cover	1	2.15
408191—Timing chain	1	4.25
408190—Crankshaft sprocket	1	1.75
408189—Camshaft sprocket	1	2.00
MAIN BEARINGS		
408291—No. 1	1	1.40
408292—No. 2	1	1.40
408293—No. 3	1	1.40
408294—No. 4	1	1.60

Engine Oiling

405591—Pump body & shaft	1	2.50
404131—Body bushing	1	.15
408046—Body cover	1	.65
408138—Pump shaft	1	.55
408043—Pump drive gear	1	1.05
393388—Pump driven gear & idler, set	1	2.30
407153—Relief valve plunger	1	.15
409766—Relief valve spring	1	.10

Clutch

408034—Housing	1	10.50
408090—Release bearing	1	1.50
408215—Disc & facing	1	8.50
*408316—Disc & facing	1	8.50
408230—Clutch cover	1	2.10
408338—Press. plate only	1	2.80
410158—Pressure spring	9	.15
†1300487—Spline shaft	1	9.00
7109—Pilot bearing	1	2.00
47507—Spline shaft brg., R.	1	5.15
*47106—Spline shaft brg., R.	1	5.25

Transmission

CONVENTIONAL

For models with automatic transmissions see model L-38.

†1301637—Case	1	11.50
†1302157—Countershaft	1	1.25
1284364—CS. gear cluster	1	11.00
1300025—Mainshaft	1	7.00
1295454—Mnshft. pilot brg.	1	.25
7506—Mnshft. brg., R.	1	4.10
1284124—Low sliding gear	1	5.00
†1300478—Second speed gear	1	7.00
†1304521—Sliding sleeve, high	1	4.50
1283878—Reverse idler gear	1	4.80
1284274—Idler gear shaft	1	.75
†1305659—Synch. drum	2	2.00
553653—Cover	1	2.00
1305334—Shift lever	1	2.75
1290429—Shift bar, low	1	.65
553447—Shift bar, 2nd	1	.60
1290430—Shift fork, low	1	1.90
553659—Shift fork, 2nd	1	1.65

Universals

408728—Center joint flange	1	1.75
403712—Joint assem., rear	1	7.25
1300121—Trans. flange	1	2.75
*1299592—Trans. flange	1	2.75
406803—Cross	2	1.25
406828—Bearing, round type	4	.75
406829—Bearing, flange type	4	.80
406813—Bearing cork seal	8	.05
499517—Pinion shaft flange	1	2.25
408713—Rear yoke spline	1	3.30
*409290—Propeller shaft, F.	1	5.00
409724—Propeller shaft, F.	1	5.00
409702—Propeller shaft, R.	1	4.75
XD88506—Shaft cen. bearing	1	5.20

Rear Axle

231968—Housing	1	19.00
231969—Cover	1	1.00
231961—Cover gasket	1	.10
500721—Diff. carrier assem.	1	60.00
*501399—Diff. carrier assem.	1	60.00
1394352—Diff. carrier & caps	1	13.75
499534—Diff. carrier gasket	1	.05
499508—Differential case	1	6.00
*1300902—Differential case	1	6.00
499509—Differential pin	1	.75
499503—Differential pinion	2	1.25

Rear Axle—continued

Mfr's Part No.	No. Per Car	List Price Each
499504—Diff. side gear	2	$3.50
*231998—Pinion & ring gear	1	18.00
492198—Pinion & ring gear	1	15.00
500215—Ring gear bolt	12	.03
499524—Pinion oil seal	1	.30
5306—Pinion bearing, F.	1	7.80
C-1509—Pinion bearing, R.	1	3.40
KA-11360Z—Diff. bearing	2	4.35
232000—Grease retainer	2	.50
231965—Axle shaft, L.	1	6.50
88128—Rear wheel bearing	2	7.00
409851—Rear wheel, pri.	2	9.50
408638—Rear brake drum	2	4.00
231177—Brake lining	1	3.00
231921—Backing plate, L.	1	2.95

Rear Springs

409929—Assembly	2	10.00
407564—Front bolt	2	.50
403589—Front eye bushing	2	.25
409769—Shackle, L.	1	1.00
409775—Shackle bushing	4	.40
408770—Spring clip	4	.35
1288224—Center bolt	2	.10

Electrical

647F—Distributor assem.	1	8.50
824735—Distributor cap	1	.75
813239—Contact arm	1	.40
1865975—Contact point	1	.30
820445—Rotor	1	.20
1869704—Condenser	1	.40
1115126—Ignition coil	1	3.25
681P—Dist. vacuum control	1	1.25
435M—Ignition switch	1	1.50
480P—Lighting switch	1	1.15
476S—Stop light switch	1	.30
820052—Starter switch	1	.75
471T—Dimmer switch	1	.65
857847—Ammeter	1	1.80
1100002—Generator assembly	1	20.00
1860344—Generator brush	2	.15
1850768—Gen. 3rd brush	1	.15
1866789—Gen. armature exch.	1	4.50
812823—Comm. end bush.	1	.15
3203—Drive end bearing	1	1.15
1854538—Gen. field coil, R.	1	.90
1859914—Gen. field coil, L.	1	.90
5814—Voltage regulator	1	4.00
739G—Starter assembly	1	20.00
811553—Starter brush	4	.10
823881—Starter arm. exch.	1	5.00
1839345—Drive end bushing	1	.10
1843041—Starter clutch	1	3.50
917565—Headlamp, prime, L.	1	12.50
922315—Headlamp reflector	2	1.25
920449—Headlamp rim, L.	1	1.00
920425—Headlamp lens, L.	1	1.85
916807—Rear lamp, L, prime	1	3.50
920696—Rear lamp, lens	2	.50
916839—License lamp, prime	1	5.00
5270389—Bat. to switch cable	1	1.00
5270390—Bat. ground cable	1	1.05

Body and Sheet Metal

(4 door sedans) (in prime)

409523—Front fender, L.	1	20.00
409503—Rear fender, L.	1	12.00
409711—Hood half, L.	1	13.00
4084574—Cowl & dash panel	1	60.00
4081958—Cowl vent. seal	1	.50
4083901—Door, stripped, L.F.	1	28.00
4033909—Door, stripped, L.R.	1	28.00
4084612—Door pillar, L., cen.	1	7.25
4083692—Roof panel, metal	1	44.00
4082733—Door glass regltr., L. F.	1	1.75
4074422—Door remote cntrl., L. F.	1	.45
4083209—Door lock handle	1	3.25
4083211—Door plain handle	3	1.35
408389—Running board, L.	1	7.50
408404—Run. brd. bracket, F.	2	.60
403405—Run. brd. bracket, R.	2	.60
408602—F. bumper bar	1	7.00
408628—R. bumper bar	1	7.00

Miscellaneous

408781—Hand brake cable	2	2.50
409966—Hand brake pawl	1	.15
409957—Hand brake sector	1	.75
231432—Master cyl. cup	1	.20
231433—Secondary cup	1	.20
231445—Master cyl. boot	1	.35
5450213—Check valve	1	.20
5301083—Wheel cyl. cup, F.	4	.20
231333—Wheel cyl. cup, R.	4	.20
5450031—Wheel cyl. boot, F.	4	.15
231335—Wheel cyl. boot, R.	4	.15
408787—Brake hose	3	1.60
409801—Chassis frame	1	62.50
1947B-2J1C—Shock absrb., L. F.	1	10.50

** For cars with automatic transmissions* *†After Engine No. F836892*

KING QUALITY
ALTINIZED
STEEL
Super-X
REG. U.S. OF A. PAT. OFF
OIL RINGS

It's ALL STEEL
It's FEATHERWEIGHT
It's TAPER PROOF
It's ALTINIZED
It's EXTRA DRY

IT STOPS OIL

More Speed

(*Continued from page 32*)

His first plan was to race his new "Mormon Meteor" 24 hours in an effort to sweep every endurance record in the books up to that point. Then if conditions were in order, he planned to continue the run for 48 hours to give the English rivals "something to shoot at" when they return next year with distance speed cars.

Jenkins was scheduled to begin his distance speed assault "at any hour now" as MOTOR AGE went to press. At this time his new creation, the most expensive he has ever built, was equipped with a single twelve cylinder Curtis Conqueror airplane engine.

At conclusion of the distance runs he plans to return to Indianapolis, if the car measures up to drafting room estimates, and bolt a second 12 cylinder engine on the rear where a large gasoline tank will be carried during the sleepless run.

After the adjustments are made at Indianapolis, he will go back out to Bonneville in late November, or possibly December if winter hasn't set in too far, and take a shot at Eyston's existing record.

Watching reports of Jenkins' hazardous mile run will be the leading automobile engineers of the world. For both Eyston and Cobb proved in the past few weeks that driving at today's peak is as dangerous as the figures are astounding.

Captain Eyston ended his bid for 360 miles per hour with his fingers crossed and admitted satisfaction at having attained the new record of 357.5 miles per hour.

Five days after Eyston established his record on September 16, he narrowly missed disaster as his "Thunderbolt" slid bob-sled fashion through the measured mile on the back corner of its metal body. The covering over the two right rear wheels had fouled and the car's shell cut the course.

He managed to bring the car to a stop in upright position, after a speed of 349.85 m.p.h., but after an inspection he said the car was too badly damaged to permit emergency repairs in the United States.

The near-disastrous run on September 21 was made in an effort to get the record up to 360 miles per hour where Eyston had said "it should safely remain for another year." He said he did not want to resume the superspeed duel in 1939 and wanted to devote his time to a distance record. Just before sailing for England, however, he was not certain whether he would bring "Thunderbolt" back next year for another attempt at his goal.

In attaining the existing 357.5 record on September 16, Eyston drove a slightly revamped machine. Having seen the success Cobb had with a finless "Railton," Eyston ordered the upright rudder removed from the "Thunderbolt" and a bullet-shaped nose over the blunt front radiator.

Also on the record-producing run, Eyston narrowly averted disaster in masterfully negotiating a wide turn at 115 miles per hour. Failing to see the six-foot-high markers at the end of the measured mile because of his speed, Eyston was a mile late in lifting his foot from the accelerator and had to cut a wide circle to avoid the trans-continental highway which runs over the south end of the salt flats.

It was on that run that he reported seeing his first mirage in speed attempts which date back three years. While he did not recount what he saw in the mirage, veterans of Bonneville speed realized that failure to ignore the hallucination might have caused the driver to suddenly change his course and throw the machine into a crazy slide.

On August 19 Cobb attained an unofficial speed of 300 miles per hour and he, too, experienced difficulty. The strong wind pressure began to pull the glass and metal from the cockpit hood and dented the tail of the light body.

Despite the difficulties encountered by the English speed aces, Eyston pointed to the Bonneville saltbed as "the greatest racing course in the world."

When Eyston departed he was faced with a full schedule of applause for his achievement. Upon arriving in London, he will exhibit his "Thunderbolt" and will bring the car here next year for a 288-day exhibit at the world's fair at San Francisco, Calif.

While it is not definite whether he will make a straightaway run in 1939, he has some sort of racing, presumably distance record attempts, "up his sleeve." Both Eyston and Cobb asked permission for use of the saltbed next season.

"B" Assortment
$12.50 Net to Dealer
Slightly higher in Canada

BALLOU & WRIGHT
SOLD $2,792.50 THE FIRST SIX WEEKS!

This famous Northwestern automotive jobber predicts that Sure-Plate re-silvering equipment will be one of the most profitable items they have ever handled. In selling $2,792.50 worth of Sure-Plate in the first six weeks they feel they have only scratched the surface and expect to sell at least a thousand more kits within the next few months.

Sure-Plate is selling this way because dealers everywhere realize its profit possibilities. It not only makes your place headquarters for headlight reflector jobs . . . but shows a profit of from $2.00 to $3.00 on every job. Order from *your* jobber today.

SURE-PLATE

I Say Goodbye To Cooling System Cracks In Thirty Minutes

Nothing works more quickly or permanently than Sure-Weld. In 30 minutes' time it gives a lasting repair to cracked valve ports, cast iron and aluminum cylinder heads, inside cracks and water jackets.

$1.40 per pint net to dealer. Slightly higher in Canada.

Sure-Weld will not clog radiators and has a cleansing effect on the entire cooling system. It's tried, tested and fully guaranteed. You can depend on satisfied customers and a generous profit every time you recommend Sure-Weld. Your jobber can supply you.

SURE-WELD

I'll clear the cooling system and rust-proof the metal for a whole year without draining the cooling system

No more draining the cooling system. No more tied up cars. Not with Kleerust. Kleerust goes to work while the car remains in normal operation. Within a month the rust will have been dissolved . . . all metal rust-proofed for a year . . . and even the water will have returned to its original crystal clearness.

Dealer's net price 60¢ per pint in doz. lots. Slightly higher in Canada.

Kleerust will not affect anti-freeze or be affected by it. You'll say it's the most amazing chemical specialty you ever sold . . . and you'll find it one of the most profitable. Dealers everywhere are winning new friends by recommending Kleerust. Order from your jobber today.

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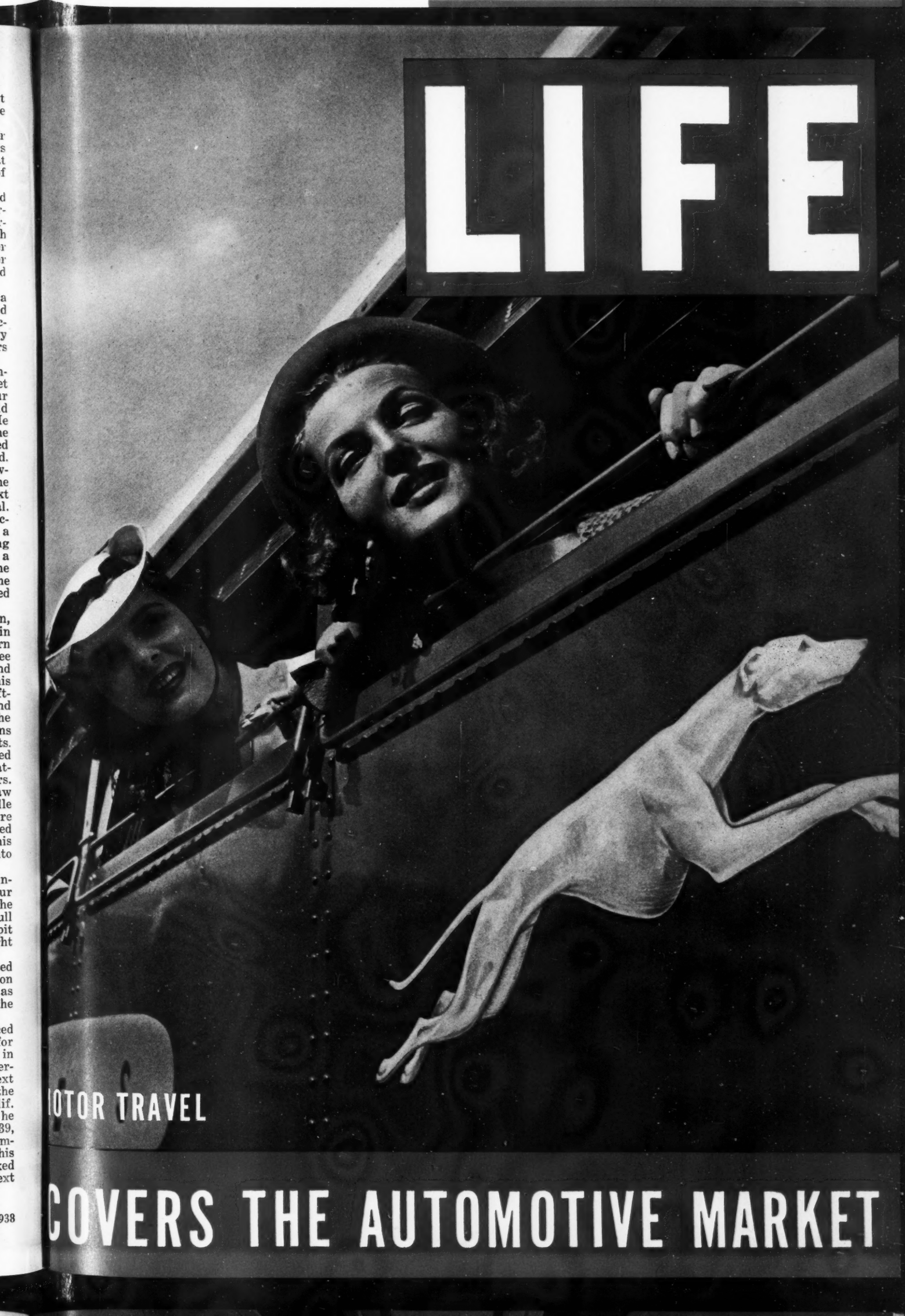
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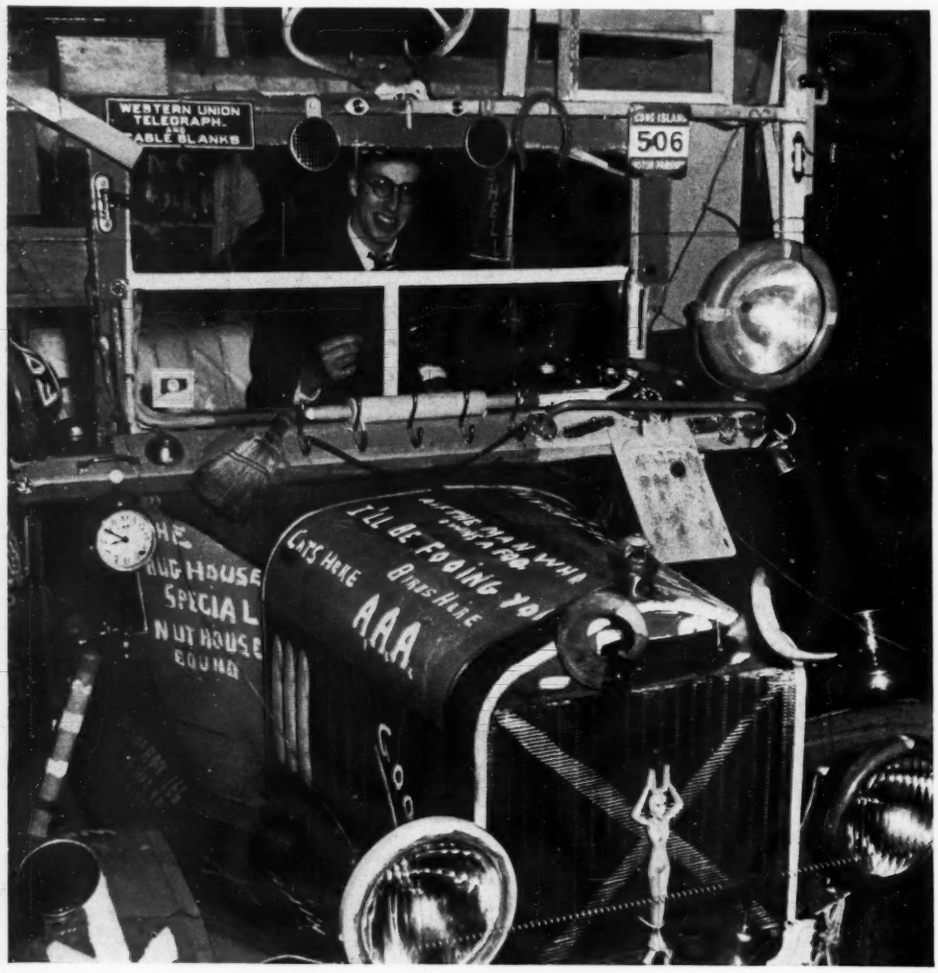
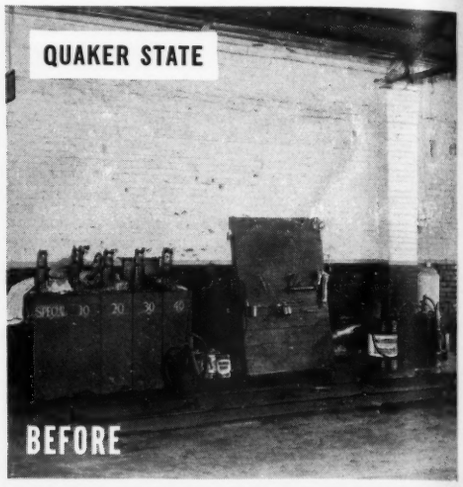


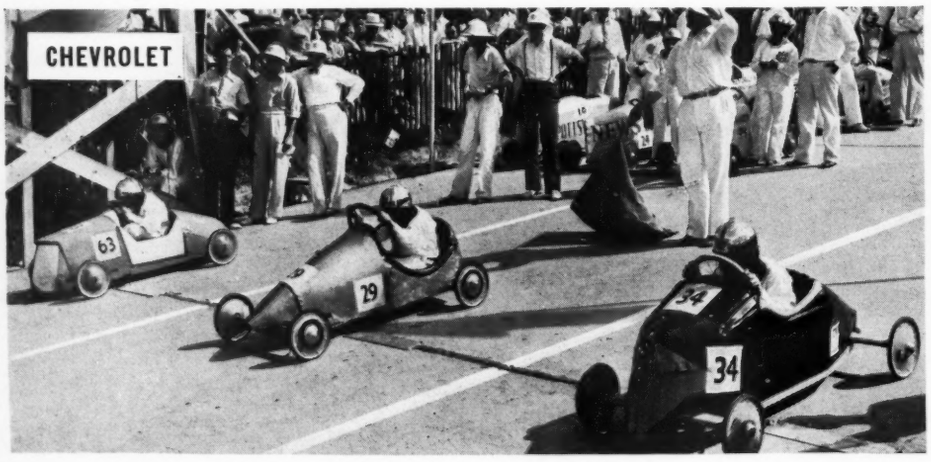
FENDER-FLOPPING YOUTH

This Connecticut lad, proudly sitting at the wheel of his hand-me-down junkman's dream ("Youth Issue", LIFE, June 6) represents an important *future* customer to the automotive industry. Restless youth craves action. It will be served and youth makes up an important part of the tremendous audience which each week reads LIFE—page by page. Over 96% of LIFE family members between the ages of 13 and 20 are regular weekly readers of LIFE. Thus, American motor tycoons are piling up an important backlog of future customers.



KITCHEN-CLEAN

Crankcase complaints are treated by Ervin Feld Motor Co., Kansas City, Mo., in this kitchen-clean shop, since this dealer signed with the Quaker State Oil Refining Corporation, a LIFE advertiser, makers of Acid-Free Quaker State Motor Oil.



LITTLE HEARTS WITH HIGH HOPES

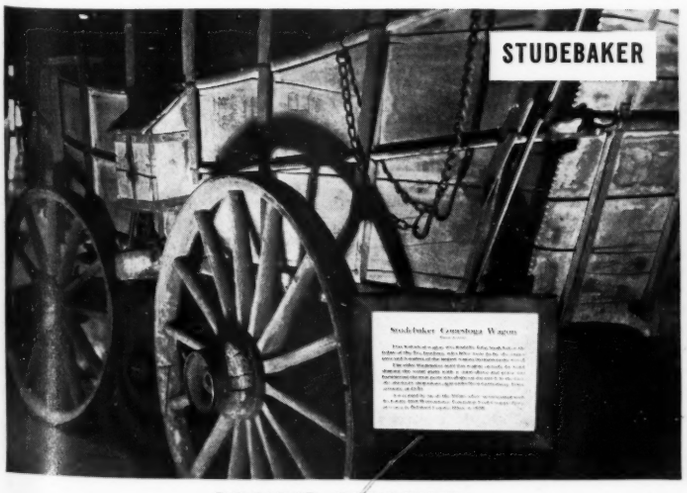
LIFE advertiser Chevrolet's Fifth Annual Soap Box Derby, held at Akron last August 14th, brought finalists to the starting line from all over the nation and from Panama, Canada and Hawaii. This greatest juvenile event in the world was covered by LIFE cameras. They recorded the triumph of 14-year-old Bobby Berger, of Omaha, Nebraska, when he established a new course record in the finals.

550-POUND COMBINATION

Thurman (Big Boy) Wolf, of Kelly-Springfield's truck tire building room, admits that he weighs twice as much as the husky 10-50-24 tire. Kelly-Springfield is a LIFE advertiser.

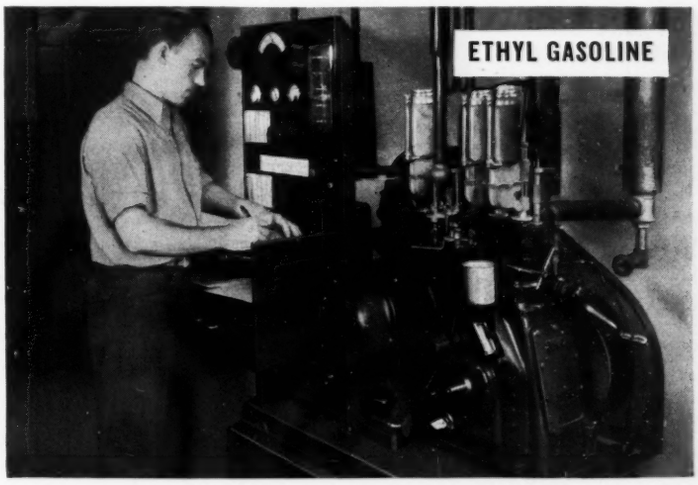
JUNGLE APARTMENT ON WHEELS

LIFE families were startled out of comfortable chairs when they glimpsed the International Trucks' color page showing Commander and Mrs. Attilio Gatti's observation-living room of one of their two streamlined trailers, now at the border of the Belgian Congo. The Gatti expedition fleet comprises three more International Trucks in addition to the two de-luxe trailer homes. Commander Gatti, now on his ninth expedition, knows the vital importance of comfort and unfailing service for his caravan, safety for supplies, provisions, precious movie and photo equipment.



PRAIRIE SCHOONER

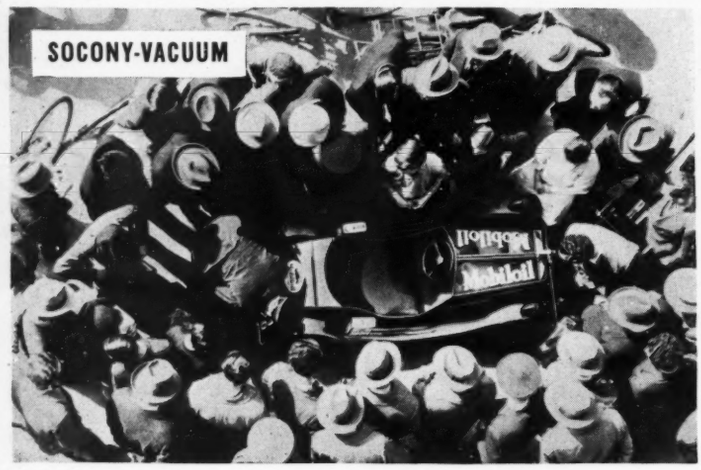
Built by John Studebaker, father of five brothers who began the business, this prairie schooner—or many like it—carried hardy pioneers to California, saw towns arise from dusty plains. Today, this LIFE advertiser is 86 years old, is headed by capable Paul G. Hoffman.



HOW MUCH DOES GAS KNOCK?

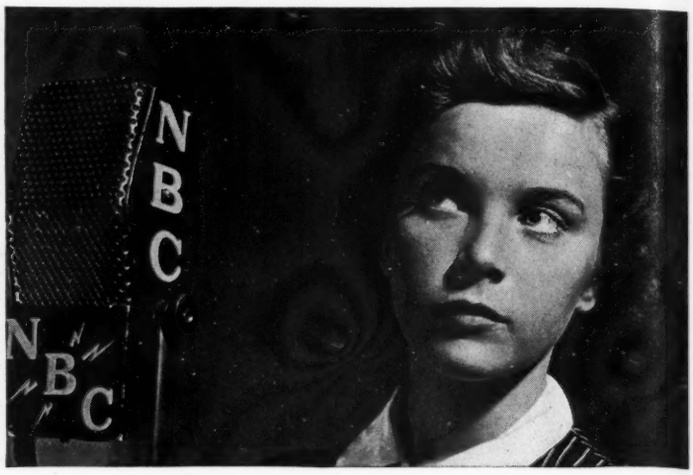
This engine gives the answer. One of many instruments used for testing purposes by the Ethyl Gasoline Corporation (a LIFE advertiser) to assure the high quality of the gasoline to which anti-knock fluids containing tetraethyl lead have been added.

LIFE IS READ PAGE BY PAGE MORE THAN ANY OTHER MASS WEEKLY



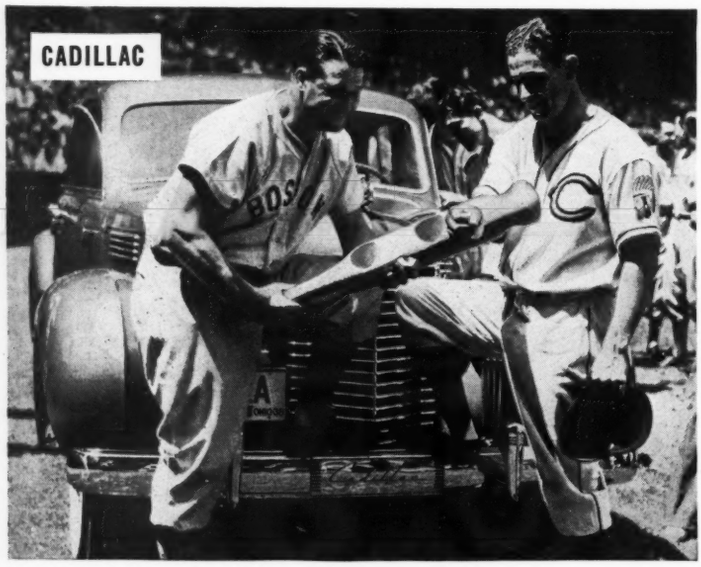
LITTLE CAR—BIG RECEPTION

Italian customers of the Socony-Vacuum Oil Company, large LIFE advertiser, are eternally curious when this 1-horsepower, under six-foot traveling Mobiloil advertisement chugs around a corner. Socony-Vacuum's representative uses it all over the country, claims it is the smallest in the world.



YANG HUI-MIN OF CANTON

A Girl Reserve in the Chinese war was the first role assigned to March of Time actress Joan Tetzel on that famed Friday-night radio program. Packed with the drama of history in the making, the March of Time is produced by the editors of LIFE.

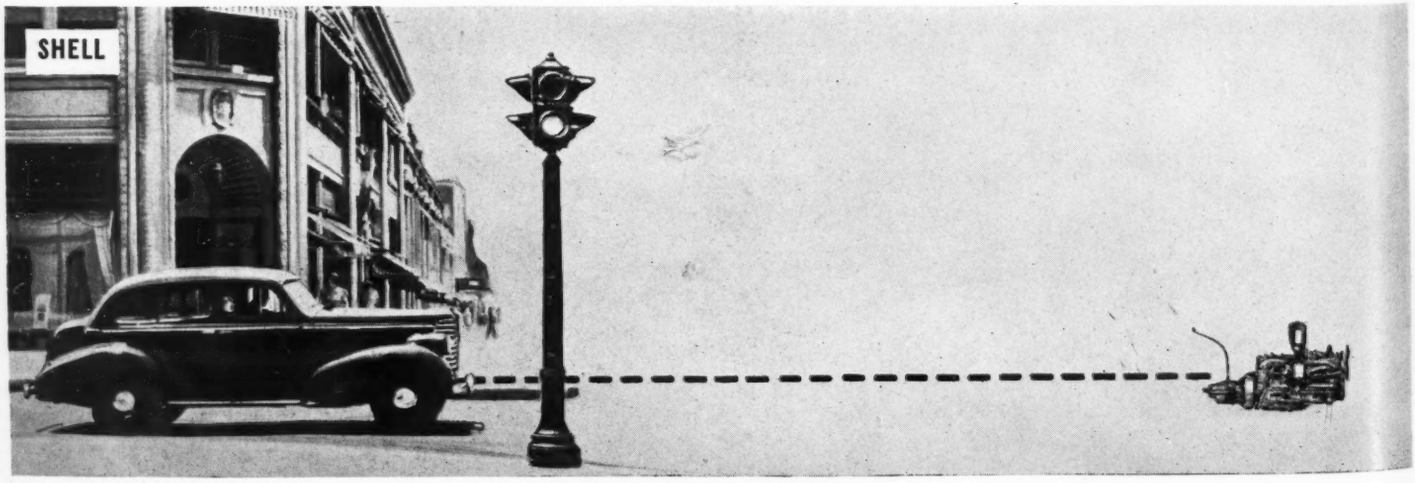


HARD HITTING TRIO

Earl Averill, Cleveland center fielder, receives a LIFE-advertised Cadillac Sixty Special from admiring fans, thus proving that baseball followers know something about automobiles. Jimmy Foxx, Boston slugger, presented with a bat well-ventilated for strikes, hopes Bostonians catch the hint.

IN THE LAND OF THE FREEZE

Even at 215 degrees below Du Pont "Zerone" anti-freeze would protect, would keep a car's cooling system free of rust and corrosion, actually would help to improve engine performance! LIFE families will soon meet the smiling attendant pictured above in more LIFE ads.



PITY THE POOR ENGINE

It goes much farther in Stop-and-Go traffic, makes enough extra revolutions starting from a traffic stop to carry a car 1/10th of a mile, according to actual traffic tests. Super-Shell gasoline regularly advertises in LIFE that it shrinks the cost of miles that Stop-and-Go driving stretches.

18 MILLION AMERICANS READ LIFE EVERY WEEK

CRIME CHALLENGER

Lloyd Chatterton, Superintendent of Communications of the Cleveland Police Department, uses a telephone-type microphone in one of the new police cars equipped with RCA two-way radio. This modern challenge to modern crime methods permits of split-second contact with the world's largest police radio station. RCA features its services and products, including auto radios, in "Listen", its own multiple-page monthly magazine within LIFE.

WHEELS TO MAKE PLATE GLASS

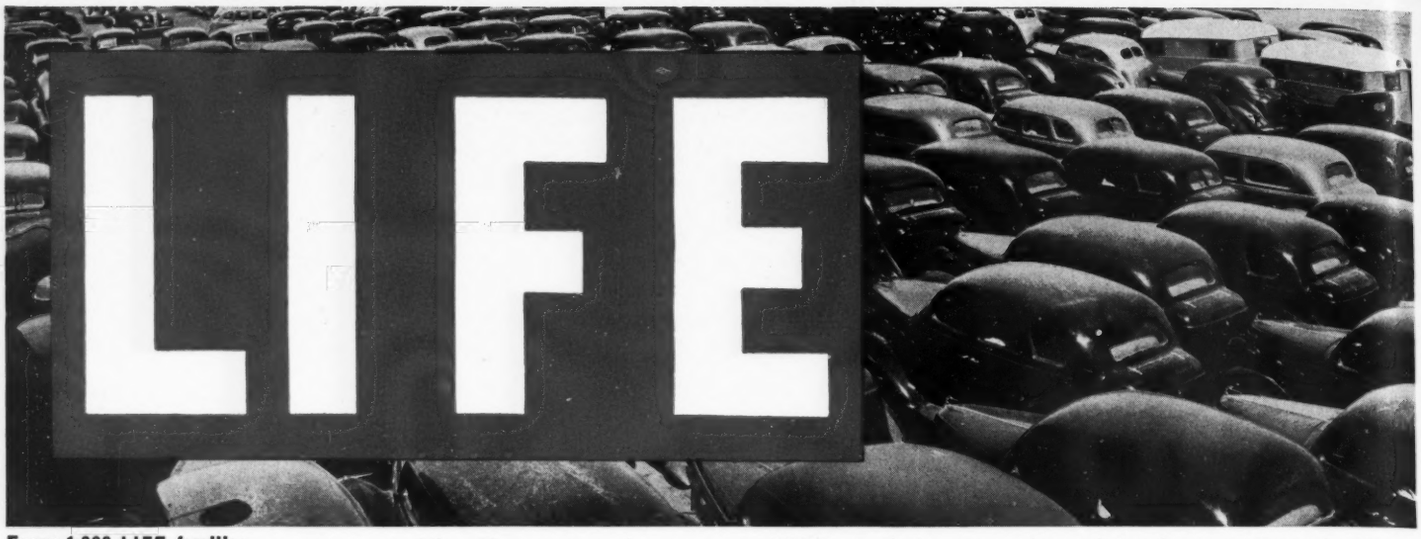
Quarter mile of grinding and polishing machines give plate glass the clarity and freedom from distortion essential to quality Safety Plate Glass, as advertised in LIFE by the Plate Glass Manufacturers of America. Safety Plate Glass is used almost universally in the motor car of today.

SELLING POINT

Last year U. S. motorists bought 19,500,000,000 gallons of gasoline. Little wonder, then, that The Texas Company uses the LIFE Force to make its selling points plainer. Typical scene shows a Texaco attendant giving all necessary information to make a trip safe, comfortable and pleasant.

HEARING IS BELIEVING

The Crosley Radio Corporation suggests this novel method of demonstrating how easily its new Safety-Tune push button Fiver Roamio (advertised in LIFE) automobile radio operates. Completely contained unit, the Roamio is quickly, easily attached to the dash of the car.



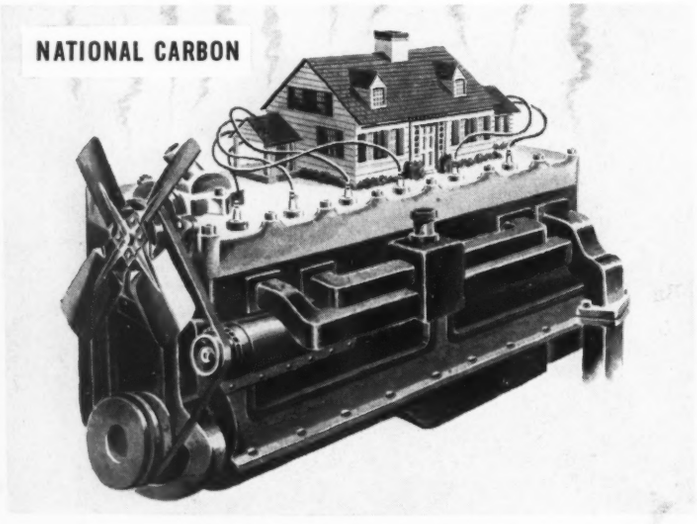
Every 1,000 LIFE families own 999 Automobiles. Almost 9 out of every 10 LIFE families own a car, and nearly 15% of them own more than one car. LIFE's circulation proves close to being the *top* 2,000,000 families of the U. S., a really important market in the automotive field.

LOW BRIDGE!

The old-time tarpaulin roof which the Diamond-T Truck banished with its steel armor-dome cab, would have meant tragedy to this driver when a 50-ton bridge fell on his cab in Camden, Arkansas. LIFE readers are being told of Diamond-T stamina in LIFE.

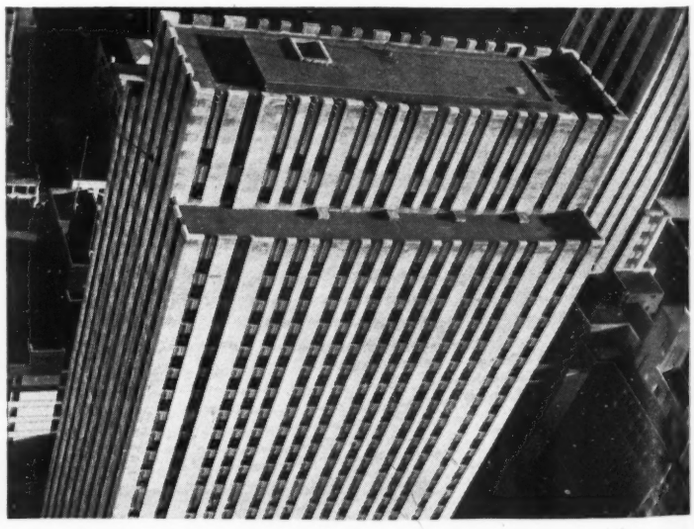
STORM AT SEA

When do BB shot become waves? When ingenious radio sound-effects men swish them around in a drum, such as on the coast-to-coast program, "It Happened So Quick", sponsored by Commercial Credit Company, a LIFE advertiser, in cooperation with state groups interested in accident prevention.



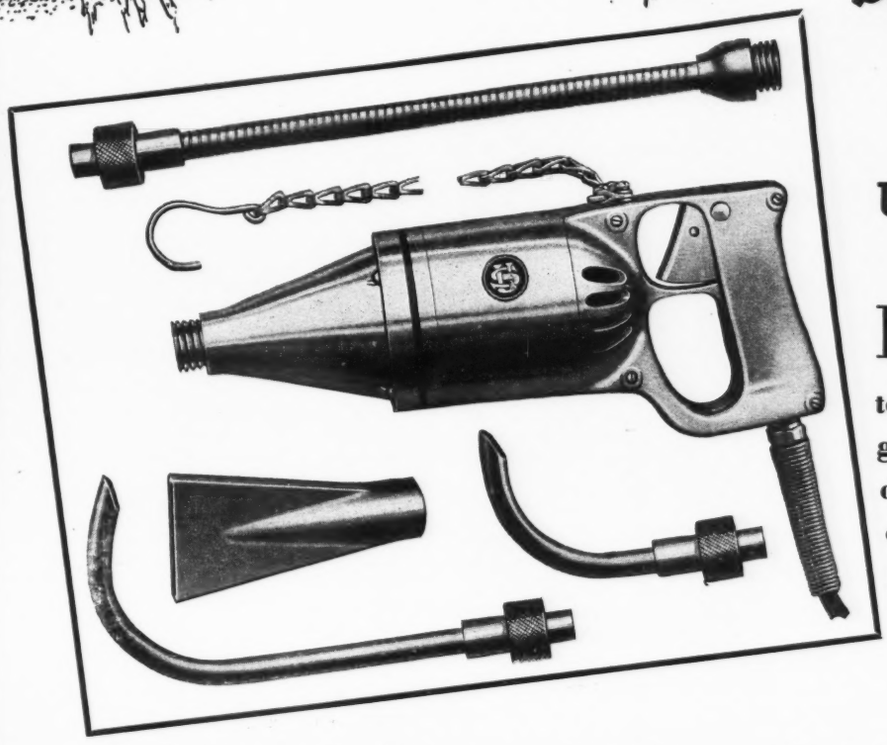
HOW TO WARM A HOUSE

Under full load and at high speed an automobile engine may generate sufficient heat to warm a 6-room house to 70 degrees on a zero day! "Eveready Prestone" anti-freeze soon will drive home this startling discovery to LIFE readers who will then understand why anti-freezes must be made to stand even abnormal engine heat.



3.7 MILES HIGHER

If this week's press run of LIFE were stacked in a single pile outside the TIME and LIFE BUILDING, Rockefeller Center, New York, the copies would reach approximately 20,800 feet skyward, would top the topmost floor by 3.7 miles! To see the world in LIFE Americans pay an average of almost $800,000 a month—more than any other two weeklies combined!



U. S. ELECTRIC HEAT GUN

FOR thawing out cars that require expert attention; for thawing frozen grease in transmission and differential; for thawing radiators, water pumps, hose connections; drying spark plugs, ignition systems, distributor heads and all heat-blowing operations.

● A compact, efficient portable unit generating instantaneous heat up to 450°. Universal motor. 15-ft. 3-conductor flexible rubber-covered cable.

AUTOMOTIVE EQUIPMENT TIME PAYMENT PLAN

FOR INSTALLING HEATERS

U. S. ½" COMMANDER DRILLS

Permanently lubricated. Ball bearing. 3-jaw geared chuck threaded to spindle. Use in connection with single cut saw Type P. S.

NEW CATALOG NOW READY

Send for your copy now.

THE UNITED STATES ELECTRICAL TOOL CO.

"THE GOOD MECHANIC'S CHOICE"

CINCINNATI, OHIO, U.S.A.

Forgings

(*Continued from page 23*)

From the beginning of the company it has been the Williams idea that intelligent, altruistic handling of the human element in business is the most important factor contributing to real success. Management, cooperation and machinery are subordinate to it in the Williams industrial philosophy. Characterizing Mr. Williams, the father, as "one of the most remarkable products of American industrialism", a writer in The World's Work twenty-five years ago said of him further, "In his conception of the economic basis of manufacturing . . . . and of the relation of employer to employe, he reached, in 1885, a stage of enlightenment which only a minority of American manufacturers have attained today."

From the Williams record can be cited many instances of "firsts" of this and that in the way of innovations which helped to make the work day of employes pleasanter and more wholesomely profitable. Among them are the first shop shower baths in the hot metal working industry, an air cooling system in the forge shop for hammer operators. The J. H. Williams & Co. Mutual Aid Association was established in 1896. The air cooling system in the forge shop was installed in 1898.

It was and is a part of the Williams code that employes must be contented, industrious and prosperous. Good wages, regularity of employment, reasonably short hours and the means for providing the maximum possible of comfort, convenience, cleanliness and safety are, according to the Williams beliefs, rightful demands of men who work. And, according to the Williams policy, these things are offered to the greatest extent possible, not only for humane reasons but also because it is regarded as good business to do so.

The modern plant of the company in Buffalo is complete with cooling fans for forge men, shower baths, safety devices, back and muscle saving equipment and such things. And at the same time, it is equiped with high production machinery especially adapted to the work to be done and is operated on a basis of high mechanical efficiency.

The business of J. H. Williams & Co. started in a rented wooden building, housing three hammers, in Flushing, Long Island. In 1884 it moved into its newly built brick factory in Brooklyn, N. Y. to which, in subsequent years, additions many times multiplying its capacity were constructed.

In 1885, Mr. Diamond withdrew from the firm. The diamond of the Williams trademark, which took its present form in 1884, was derived from his name. In the same year also, the formula for 15° angle engineers' open-end, single and double wrenches was developed for the company by Charles T. Porter, who was employed as an engineer for that purpose. Porter's design became the first standard line of drop-forged wrenches and the first line to employ the 15° angle of opening, since generally adopted for hexagon bolt heads and nuts, and which, in the words of its earliest printed description, "admits of turning a hexagon nut completely around where the swing of the handle is limited to 30°".

In 1887, it is interesting to record, William C. Redfield, who was to become Secretary of Commerce in the cabinet of President Woodrow Wilson, joined J. H. Williams & Co. as a partner. Upon the death of the elder Mr. Williams in 1904, Mr. Redfield was elected president of the company and J. Harvey Williams, the present president, was elected vice president.

It was decided in 1911, because of the growth of the business and the somewhat general shift in the location of the market for its heavier products, to move the company's plant to Buffalo. Accordingly an extensive tract of land was bought on the edge of that city and, in 1913, the erection of a very large plant was begun. Operations in it were started, in June, 1914. Vulcan Street, on which the plant is located, took its name from a line of J. H. Williams & Co. products. The Brooklyn plant was closed in 1923 and all Williams' manufacturing has been done since then in Buffalo. The company maintains a general and sales office in New York City and a sales office and warehouse in Chicago. The forgings-to-order sales office is in Buffalo.

Rx... FOR MOTORS THAT "Can't Be Cured"

There have been many rings fairly successful in sealing well-worn cylinders *at ordinary speeds,* or in correcting *slight wear* at high speeds. But the new Burd "Super-Hi-Speed" is fully engineered for BOTH a high degree of distortion and the super speeds of modern motors.

Besides their ability to revive motors that "can't be cured", Burd "Super Hi-Speeds" have plenty of passage-space to drain off surplus oil, plus reservoir capacity . . . not for large amounts of oil, but films in capillary control to furnish complete cylinder lubrication under all conditions of speed, load and compression. They guard from oil starvation as well as oil waste. Write for details today!

BURD PISTON RING CO., Rockford, Ill.
Associate Co., Liberty Foundries Co.

(A) is in itself a complete, extremely flexible cast ring with the famous Burd "Hi-Speed Quik-Seal" feature for instant sealing on worn walls; (B) are steel rings with "waved" inner edges to engage notches in the cast ring. These waves permit complete assembly to "breathe" and prevent rotation of segments in operation; (C) Swedish steel inner spring . . . exerts pressure on cast ring *only,* giving it the utmost in flexibility, without excessive tension or interference from steel rings.

BURD Super Hi-Speed PISTON RINGS

LINDBLOOM VALVE PACKING • HaDEES HOT WATER CAR HEATERS

ATLANTA, GA. . 542-544 Spring St. N.W.
BOSTON, MASS. . . . 1 Brighton Ave.
CHICAGO, ILL. . . 2236 S. Wabash Ave.
DALLAS, TEXAS . . . 2705 Canton St.
KANSAS CITY, MO. . 1806 McGee St.
LOS ANGELES, CAL. 1425 S. Flower St.
MINNEAPOLIS, MINN. . 21 S. 13th St.
NEW YORK, N. Y. . . 549 W. 52nd St.
ST. LOUIS, MO. . . 3225 Locust Blvd.
SAN FRANCISCO, CAL. 545 McAllister St.
SEATTLE, WASH. . 1609 Boylston Ave.
TORONTO 5, Ont. Can., 115 George St.
WINNIPEG, MAN. CAN., 126 Lombard St.

GET PROMPT SERVICE FROM ANY OF THESE CONVENIENT BURD WAREHOUSES

The present officers of J. H. Williams & Co., are J. Harvey Williams, president and treasurer; A. D. Armitage, vice-president; Hugh Aikman, secretary; C. M. Fleming, assistant treasurer and Charles B. Harris, assistant secretary.

In the main line of its activities the company has stuck closely to the plan set forth in its first announcement. Today, and for many years past, however, its drop forgings are not and have not been limited to "thirty pounds in weight"; its original line of drop-forged wrenches has been greatly extended to include some fifty different types—alloy and carbon steel. In addition, detachable socket wrenches, various types of reversible ratchets, adjustable wrenches, etc., have been developed to meet the needs of changed conditions. The J. H. Williams Co. catalog now contains hundreds of items of which the founder could not possibly have conceived or, if he had, could not have sold.

The automotive repair man knows the "Superrenches", the "Multisockets", the "Supersockets", the "Superjustables", the "Superectors", the "Superpliers" and many other such tools and appliances which are now in the Williams catalog. The automotive engineer and production man know the quality and variety of Williams' drop-forgings for crankshafts, axles, yokes, steering knuckles, connecting rods and what not.

Progress is marked by development and change and, in the case of J. H. Williams & Co., since its small and remote beginning, there has most certainly been progress—progress of a kind which has benefited many—progress which has set a high standard for emulation by others who build businesses and make jobs in the industrial field.

Here are some facts and figures that show how a business can grow with resulting benefit to both management and men under the American System of Enterprise if we give sway to the American way. In the first year of its operations, J. H. Williams & Co. had a total payroll of $6,196.44. The total sales for that year were $6,093.00 and the company lost money. Since that time the annual payroll has reached a high of $2,068,868.65 and the total paid out in wages to workers, for whom Williams ambition and enterprise provided the opportunity for better living, since the company started to the end of 1937, amounts to the impressive sum of $34,058,307.51. The number of men whose livlihood was derived from Williams' activity rose from 15 in the first year to a maximum of 1,200. There are 22 men still in active service with the company who were originally employed thirty or more years ago. Throughout the company's history most of the men active in responsible operating positions have come up from the ranks.

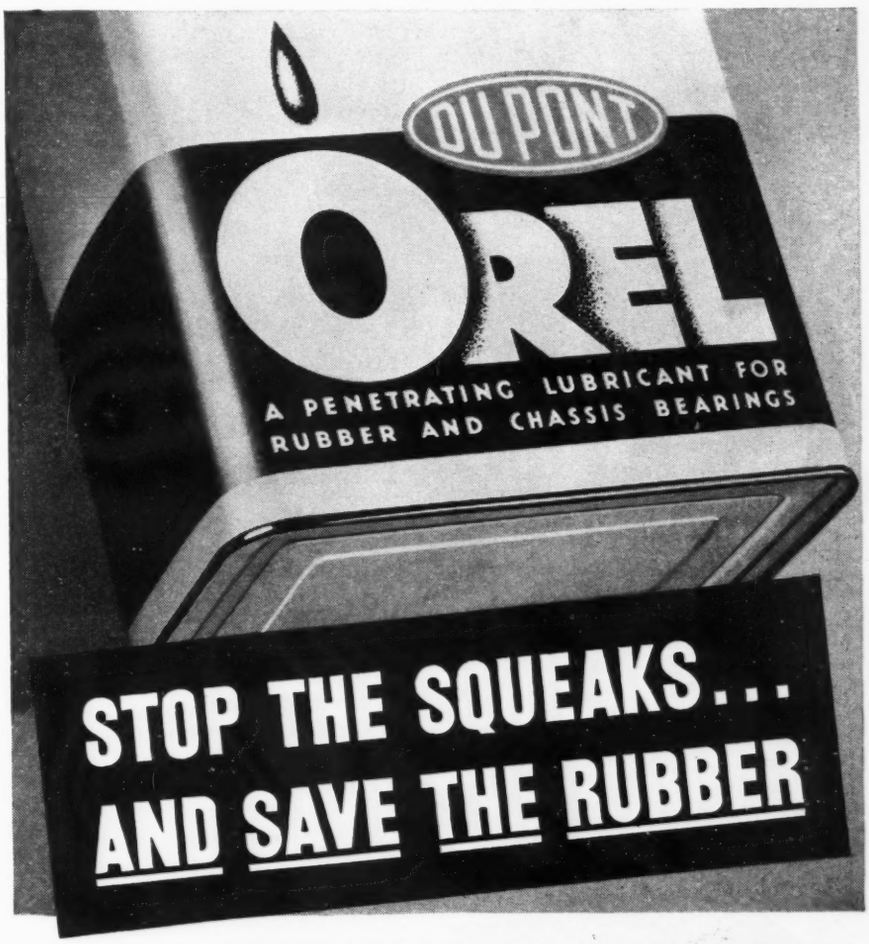
For its contributions to the advancement of industry and industrial relations, through its continued exemplification of the principles of its founder, J. H. Williams & Co. has its place on the honor roll of those who have helped notably to establish the unsurpassed and unsurpassable record of the American System of Free Enterprise.

MEMA Monthly Index*

*Motor Equipment Manufacturers Association

(January, 1925, equals 100)

	July, 1938	June, 1938	July, 1937
Original equipment shipments to vehicle mfrs.	60	74	153
Service parts shipments to wholesalers	125	119	154
Accessories shipments to wholesalers	100	99	116
Service equipment shipments to wholesalers	89	90	127
GRAND INDEX (Composite) of above divisions	75	84	148
Index car and truck production	63	79	190
Index general business (bank transactions)	72	71	80



New penetrating lubricant, made by Du Pont, quiets squeaks and groans . . . won't harm rubber

HERE'S an entirely new chassis lubricant that lets you offer better, longer-lasting lubrication! It's "Orel," Du Pont's new lubricant for all rubber parts and metal-to-metal chassis contacts.

"Orel" won't harm rubber. That's why it's the ideal lubricant for bushings in shock absorber arms, spring shackles, sway eliminator bars, motor and body mountings, rubbers between spring leaves, fan belts, knee action unit arms. "Orel" has such unusual penetrating qualities that it reaches spots where ordinary "penetrating oils" cannot go.

If you want to give your customers the *extra* service that brings them back to you, make "Orel" part of your lubrication routine. It's easy to apply, either with a brush or with an oil can that squirts a thin stream.

"Orel" is made by Du Pont, makers of "Zerone" Anti-Rust Anti-Freeze.

Cases of three gallons, $1.85 per gallon. Five-gallon containers, $1.75 per gallon. Order "Orel" from your "Zerone" jobber, today, when you're ordering "Zerone," too. E. I. du Pont de Nemours & Co., Inc., Wilmington, Delaware.

Line-Up

(*Continued from page 25*)

lot of Ford dealers in the country and the prospects of a land-office business looked good.

History does not tell us whether or not this was the time when the famous expression "Somebody's always taking the joy out of life" originated, but it surely happened out Rock Island way.

So, there were those men in Rock Island, fully aware that the hand starter was no more and if they wanted to remain in the manufacturing business they had to think up something else for which there was a demand and sales possibilities. After all, these men, most of them, had no previous training along manufacturing lines. They had been raised on farms and most of their training had been in the grain business.

But they liked the automobile business and meant to keep on in it. It looked like there were possibilities in the tire chain business and for a time this company made hook-on or emergency chains. Things went along for a time, but they were not knocking the cover off the ball. However, the association with tires and wheels that these men had planted a germ in their minds which has since developed to the extent where the company's name is known practically everywhere.

Long before this, the reader has been aware that we have been talking about the Bear Manufacturing Company, of Rock Island, Ill. Its president Will Dammann, is the man who was the Ford dealer in South Dakota. His brother Henry Dammann, has been associated with the company since its inception at Rock Island. Their story of progress reads like the story of many other successful American business men who dared to do things and stuck to their guns in spite of many obstacles.

No need to remind readers that the "smiling bears" are stretched from coast to coast and from Canada to Mexico. Hardly a town of any size but what boasts of a "Bear Service Station."

It must be remembered that the "Bears" had to do a lot of pioneering in the designing and development of their present type of equipment. Balloon tires and different kinds of wheel constructions, front axle layouts, springs and so on brought with them a lot of problems in service that had to be licked. Shimmy and "tramp" baffled many a service man and the tire men, too.

Most every one will recall that the cars back of 1929 were good looking cars and fast. The shock absorbers, however, did not seem able to take care of all the bumps and in those days tires that could go for 10,000 miles were something to talk about. The trouble was that tires had not been introduced to wheel aligning and wheel balancing.

It will be recalled that along about 1929 the boys were "souping" their cars for the Indianapolis 500-mile race and were running well around the 100-mile per hour average. But the cars and men took a lot of punishment. Tires were ruined.

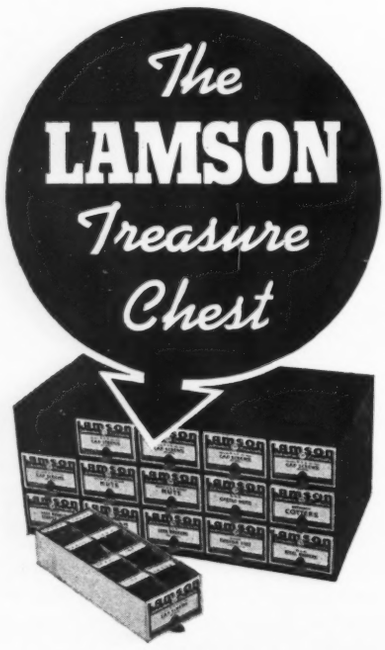
A way out presented itself. History has it that the speedway men looked to the individuals at Rock Island who apparently had something.

History again shows that one day the men from Bear trekked their way to the speedway pits bringing with them a mess of instruments, fixtures, gages, and so forth. Old man experience began to do things to the wheels of race cars. The wheels behaved at high speeds and new records were established with safety to drivers. The men from Bear recognized the heavy spots in wheel assemblies. They knew that if there was a heavy spot the great centrifugal force would keep trying to throw it off. It was this tendency that was making the wheels bounce even when there was no bump to make them bounce. By putting weights on the rim at the right spot they overcame this tendency and static wheel balancing was born.

But new cars with finger-tip steering, knee action front ends, had problems. Owners complained of wobbles and hard driving. Even with everything apparently set to service standards. Even with static balance something was still wrong. The men from Bear were just as busy as any one else seeking for a remedy. They took many cars out for road tests. On one of these tests the Bear company did a little experimenting.

FIND THE SIZE...FIND THE KIND of Fastening You Need

...without hunting!



Not only does the LAMSON Treasure Chest contain a complete stock of only the needed sizes of bolts, nuts, cotters, cap screws, lock washers and similar parts — but the entire stock is contained in the 15 drawers that fit into the steel cabinet itself. Each drawer is labeled, shows contents at a glance—*and the price per piece!* And that isn't all! LAMSON 1035 Double Heat Treated Cap Screws are included—the famous cap screw made especially for the replacement parts business, with the extra length thread that increases its usefulness. Stocked complete from $9.95 to $29.50, depending upon your selection. Ask your Jobber's salesman all about it—or write us for complete information.

THE LAMSON & SESSIONS CO.

GENERAL OFFICES, CLEVELAND, OHIO

Manufacturers of the **LAMSON "25" LINE**

This advertisement appears in MOTOR AGE—October 1938; and in MOTOR WORLD WHOLESALE—October 1938

They took a wheel balancing lug that had been put on the inside of the rim off and put it on the outside instead. It corrected the wobble of the wheel and again the Bear Company felt they had something. This was the beginning of balancing wheels dynamically in addition to static balancing. Out of it came the present equipment which with the aid of electrical contacts and a "Neon-eye" indicates precisely the point in the tire or wheel where the wobble is located.

The name "Bear" came about with little or no ceremony. The men were gathered around their first wheel aligner, which Will Dammann was to take out on the road to demonstrate and sell. Spread out before them was a Chicago newspaper and someone spotted a picture of a bear. "It's a bear" was the jargon of the streets in those days, too. "Everyone likes Bears" pointed out Will Dammann and so, without further ceremony the Bear Company was named. There has been a process of evolution in the Bear insignia. The "smiling bear" used as the company's insignia today is of more recent origin. Before that, several other designs of bears were used. But the smiling bear of to-day, holding the shield, will probably be standard for a long time.

In talking with Mr. Dammann he tells you that records of experience during the past several years clearly indicate that the average motor vehicle is greatly in need of correct alignment service. Today passenger cars, trucks and buses are coming into shops more often for alignment attention. These misalignment conditions cause wrecks, frequent king pin and bushing replacement and costly spring work, all of which reduce operating performance and efficiency.

Mr. Dammann goes on to say the result of such misalignment conditions on cars, trucks and buses is a costly one in dollars and cents.

The rising tide of public opinion concerning the safety of motor vehicle operation on streets and highways makes it imperative that operators adopt proper maintenance measures to obtain the greatest possible safety factor in passenger car, truck and bus operation. Alignment inspection and correction is definitely a safety maintenance service.

During the month of August of this year the Bear company opened up a safety inspection lane alongside its plant at Rock Island. The Safety Council of the Rock Island Chamber of Commerce in cooperation with the Rock Island police department recently sponsored a week of safety inspection. The city-owned motor vehicles were the first to be inspected and put into shape and thereafter, a steady stream of cars took advantage of the lane. There was nothing compulsory about the inspection. The thought was to instill in the minds of car owners generally that brakes, wheel alignment, steering, headlights and other safety factors can be off without the car owner being conscious thereof.

Bear maintains a factory school which is the proving ground for all Bear alignment tools.

The idea, design, plans and first working models of a new Bear alignment tool are only the beginning of the extensive efforts involved in its development. This experimental and development work is carried on under actual operating conditions at the Bear school where mechanics and engineers do a thorough testing job.

Each year more and more men attend the school. Among the students are many experienced owners of Bear equipment who return to get new ideas and kinks on this rapidly growing and important automotive service.

No charge or tuition fee is made. Living and transportation expenses are borne by the student. The school is open to all who earnestly desire to become alignment experts. For the convenience of those who live too far away, the Bear company has established other schools in various states.

Misener Has Rotary Hack Saw

A tool that is particularly useful at this season of the year is the rotary hack saw manufactured by the Misener Mfg. Co., Inc., Syracuse, N. Y. It is used extensively by garages and service stations, according to the manufacturer, for the installation of heaters, radios and other accessories. The saw is adjustable for all automotive sizes, is moderately priced, and replacement saw blades are available at low cost. An attractive counter display is available for jobber use. For complete information and price, write the manufacturer.

SIMMONS MUFFLERS

Leakproof

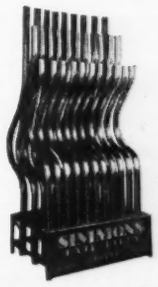
Easy to Install

Instead of the usual crimped end construction of the ordinary muffler, Simmons Mufflers are welded to assure a leakproof joint, making the ends and the muffler body virtually one piece of solid metal.

A complete set of interchangeable end adapters comes packed with each muffler. Selecting the one with a diameter matching that of the pipe, the mechanic fastens it in place with a few quick turns on the bolts. Tapered construction of these end plates assures positive, gas-tight fit. Slotted neck allows for tightening firmly around tail pipe.

. SIMMONS .
Tail Pipe Display Stand

Every muffler replacement offers the opportunity for selling a new tail pipe. The Simmons Tail Pipe Display Stand provides a convenient means of stocking and displaying as many as 53 pipes. Order a stand, as illustrated, thru your jobber



TAIL PIPE DISPLAY STAND

CATALOG

For latest data on mufflers and pipes to fit 1937 and 1938 cars, keep the Simmons Catalog No. 311 handy Write for a free copy.

The SIMMONS MANUFACTURING Co.
ASHLAND, OHIO

Manufacturers of Silver King and Power King Hydraulic Jacks; Mufflers for all cars; Carburetors for all cars; replacement parts for Ford, Chevrolet and Plymouth.

SEND NEW MUFFLER CATALOG TO:

NAME

ADDRESS

CITY

PRE-TESTED

Every feature of "Zerone" and its pre-tested ... to assure maximum

READ HOW THE MAKERS OF AMERICA'S FAVORITE $1 ANTI-FREEZE TAKE THE GUESSWORK OUT OF YOUR ANTI-FREEZE BUSINESS THIS SEASON!

IN THE four years that "Zerone" has been on the market it has become the fastest-growing anti-freeze in America . . . the anti-freeze choice of millions of motorists.

But what of it? Long before the record-breaking 1937-'38 season ended, we were already laying unique and sure-fire plans to make your 1938-'39 "Zerone" season top even that. And your success with "Zerone" in this coming season has now been completely *pre-tested!*

None of the three factors in your "Zerone" sales has been left to guesswork. Exhaustive tests have proved that the *product* is right . . . that its *consumer acceptance* is right . . . and that its *consumer advertising* is right for still another big jump in "Zerone" sales and profits.

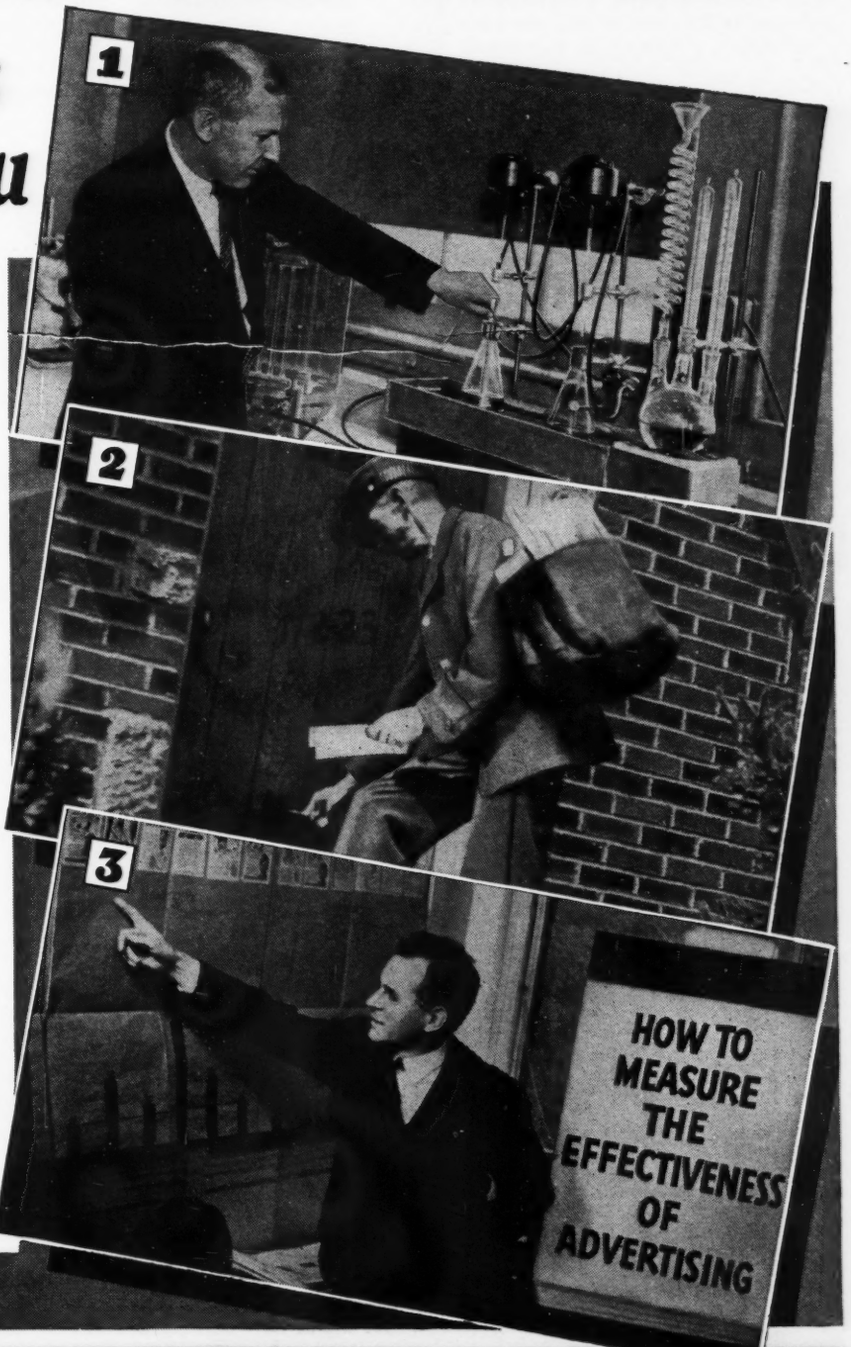
Remember, you don't have to wait until it gets cold before you can sell "Zerone." Call your "Zerone" jobber and get your order in *now!* E. I. du Pont de Nemours & Co., Inc., "Zerone" Division, Wilmington, Delaware.

TIE UP WITH ZERONE

REG. U. S. PAT. OFF.

PROFIT FOR "ZERONE" DEALERS THIS YEAR!

promotion is profit for you



1 PRE-TESTING THE PRODUCT. Here is the laboratory set-up for proving definitely that the boiling point of "Zerone"-water solution is safely above the normal operating temperatures of the automotive cooling system. There is little or no loss of protection due to evaporation because "Zerone" makes a perfect mixture with the water in the cooling system. "Zerone" lasts longer!

• • •

2 PRE-TESTING THE POPULARITY. Mail surveys and personal interviews have been made in hundreds of representative cities and towns by impartial organizations. The results show that *people like "Zerone" better than any other $1 anti-freeze on the market.*

• • •

3 PRE-TESTING THE ADVERTISING. There's no "by guess and by gosh" to "Zerone" advertising. At a cost of thousands of dollars, we've tested many anti-freeze appeals and techniques in the newspapers of several representative cities. On the basis of direct returns from keyed ads, we've found one "most effective" on which to base this season's bigger-than-ever campaign. Take advantage of the pre-tested power of this advertising.

for PRE-TESTED *PROFIT*

Buick

(*Continued from page 12*)

with an improved accelerator pump for fast low-speed operation are used. The carburetor embodies an integral automatic shoke, eliminating the extra linkage to the choke valve.

Due to the tilting of the engine, intake manifolding has been redesigned to maintain a level and even distribution of fuel mixture to each cylinder.

The new "Crown Spring" clutch used on the Series 40, features a total of only nine parts as compared with 41 parts for last year's assembly. Its principal element is a conical disc spring with a corrugated surface. This clutch as well as the other clutches in the Buick line, is fitted with a redesigned clutch driven plate with a strong but much lighter hub, reducing inertia by almost one-th rd. As a result, driven plate spinning after disengagement is considerably reduced. The clutch pressure plate and cover assembly on the Series 60, 80 and 90 remain unchanged.

Clutch linkage and controls have been completely redesigned for all Series. The clutch pedal is mounted on the frame, similar to the present Series 40, where it is free from unsteadying influences. The overcenter pedal return spring construction introduced on the 1938 Series 60, 80 and 90 will be continued, and also used on the 40.

The release yoke is entirely new and may be easily withdrawn from the clutch housing without difficulty. A new clutch release bearing sleeve has been developed which is one piece except for the riveted-on yoke retainer spring.

Front suspension system on all models is continued without change except in some details. Series 40 and 60 have new lower control arms and a new rubber bumper. In addition, rubber bushings replace the metal bushings in the inner ends of the lower control arm at the frame. A washer and nut on each end retains these bushings. Series 40 and 60 front shock absorbers have a different shape housing and new type of arm to conform to the improved suspension geometry.

Major changes have been effected in the rear axle and wheel suspension system on 40 and 60 models. In the first place, the torque tube drive now is made in two separate sections, one extending from the transmission rear bearing retainer to the torque ball retainers at the frame center cross member, and the rear torque tube extending from the retainers to the differential carrier. The torque ball, universal joint, and retainers are supported by two rubber-and-steel pedestal assemblies secured between the rear center crossmember and each side of the torque ball outer retainer. The rear torque tube is welded to a steel insert which is cast into the front end of the differential carrier.

This construction not only permits a lowering of the rear floor without adding a high tunnel but has been found to improve the ride materially. A rubber coating is now vulcanized to the torque ball, and treated with a special compound to make it self-lubricating, the rubber coating providing a definite barrier to rolling noise.

Feature of all models is the "Handi-Shift" gear shift control, operated by means of a lever mounted under the steering wheel.

Series 40 transmission is entirely new. It is a smaller and more compact unit due to the adoption of the new shift and cross over linkage. The mainshaft is piloted in larger cageless roller bearings. Counter and reverse gears have been given increased life through improved lubrication. Gear ratios in first and reverse have been changed to permit faster acceleration in low gear. The rear bearing retainer is redesigned to accommodate the new torque tube drive.

Series 60, 80 and 90 transmissions are essentially the same as before, save for the new shift mechanism, with a new rear bearing retainer to accommodate the torque tube drive. The helical nickel-chrome gears are continued in these transmissions.

Bodies for the 40 and 60 Series are entirely new, featuring the Unisteel construction with greater visibility over the front end of all models.

Front end styling characterizing the entire line, features die cast, chromium plated radiator grilles mounted in the front fender aprons just above the bumper line. There is no center grille, the hood line being faired into the front and sheet metal in a graceful tapered line.

EIS "Super Duty"

"PERFORMANCE"
is our best Salesman

Almost any product can be sold once on "claims." But to stay sold it must live up to those claims!

For almost seven years we have been telling brake stations that

EIS BRAKE FLUID . . .

—Contains no water to cause corrosion of metal.
—Contains no acid to cause deterioration of rubber.
—Doesn't change under heat or pressure because of chemical stability.
—Has an abnormally high boiling point and low freezing point.
—Is more economical due to its high viscosity.
—Has higher lubricating efficiency on account of its greater oil content.
—Mixes with all fluids that car and truck manufacturers recommend.

Every one of these "claims" is borne out in the test of actual service. Eis Brake Fluid stays sold on its "Performance." That is why we say "Performance" is our best Salesman.

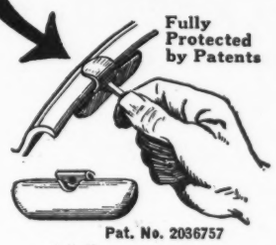
Give "Eis Super Duty" a trial. You will be more than gratified with the results.

Don't delay—write today for the New Lower Price Schedule

EIS MANUFACTURING CO., INC.
"The Complete Brake Parts Line."
1365 Jerome Avenue, New York.

QUALITY EIS MFG. CO. INC. THE BRAKE PARTS LINE

Make Money This Easy Way!



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L & H Balancing Weights

When a car comes into your shop for service, make an extra profit by balancing the wheels! Thousands of service shops are doing it. Why not you? The equipment costs little, and will add hundreds of dollars to your annual profits. Write for full information.

HARLEY C. LONEY CO.
16883 Wyoming Ave. Detroit, Mich.

WRITE for CIRCULAR

Announcing the TURN-LITE

The Dependable Direction Signal with Universal Switch

Sturdy, dependable, water-tight, dust-tight—5 models for all types of installations on trucks and buses.

This new Do-Ray Turn-Lite also has a compact switch that may be mounted either on steering post or gear shift lever. Only 4 wires to connect. Easily installed. Ask your jobber or write

DO-RAY LAMP COMPANY
1458 S. Michigan Ave.
CHICAGO

Flares (Electric and Oil) • Tiger-Ey and Knobby Reflex Devices • Foglites • Stop and Tail Lamps and Specialties

A COMPLETE CHEMICAL LINE MAKES MORE MONEY FOR YOU!

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Every automotive chemical need is supplied by FLARE, the Complete Automotive Chemical Line. The easily identified, attractive packaging of FLARE makes each item a vital part of a great line. Each item sells all other FLARE products because every FLARE product is as perfect as quality ingredients and exhaustive testing can make it.

HYDRAULIC BRAKE FLUID

Made of the highest grade vegetable oils and other ingredients, perfected and proved under rigid laboratory and road tests. The choice of thousands of satisfied users.

FLARE FLASHOIL A-B

with colloidal graphite. To use in "top cylinder" oilers or to mix with gasoline for motor break-in, for added cylinder lubrication, for easier starting.

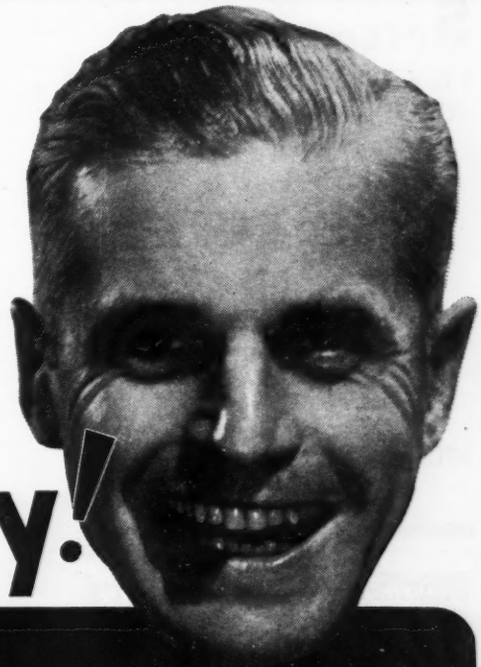
FLARE (formerly Flash) LABORATORIES 1858 W. Kinzie St. Chicago, Illinois

For Bigger Washing Profits For Lower Washing Costs You Need SPEED WASHING

Rotawasher is ideal for cleaning floors in garages and oil stations, also for cleaning chamois skins.

Write today for folder and full details

THE ROTAWASHER CORP.
126 East St. Clair Ave., Cleveland, Ohio



Hey!

Getting that extra profit on tune-up jobs? Remember to install

DOLE REPLACEMENT **Thermostats**

See page 69

CLASSIFIED ADVERTISING

Motor Temperature Gauges Repaired—All Makes Automobile—Bus—Tractor—$1.50—Marine $2.75. Lines shortened or lengthened. All Work Guaranteed.

United Speedometer Repair Company, Inc.
436 West 57th Street New York City

NEW for the first time in Flat Rates CHILTON'S 1939 Book will have Tractor tune-up and Diesel Engine data

MUELLER UNIVERSAL BATTERY CLIPS

The Original and Only Complete Line Recognized as the Best Made

Battery Charging Jumpers

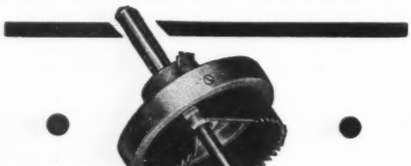
Battery Carriers, Post Shims, etc.

Send for Free Samples and Complete Catalog 706!

Mueller Electric Co.

Clip Makers for 30 Years

1590 E. 31st St., Cleveland, Ohio



SPEED UP INSTALLATIONS OF

Car Heaters • Car Radios Other Car Accessories

WITH

MISENER

ROTARY HACK SAWS

Low cost, fast cutting, deep blades, all Automotive Sizes. Cuts quick clean holes in steel, sheet metal, wood or fibre.

Used by Service Stations and Garages everywhere. See your jobber or write.

MISENER MFG. CO., INC.

Tool Specialists

SYRACUSE, N. Y.

TRADE MARK

NOC-OUT HOSE CLAMPS

THE HOSE CLAMP WITH THE THUMB SCREW

Standard equipment of the automotive industry. Adjustable—one size equals many. Quick tightening, perfect seal. Makes radiators and heaters "Anti-Freeze" tight. Stock up now and be ready for the first cold snap. AT ALL JOBBERS.

WITTEK MFG. CO.

4305 W. 24th Pl., Chicago, U.S.A.

Happ

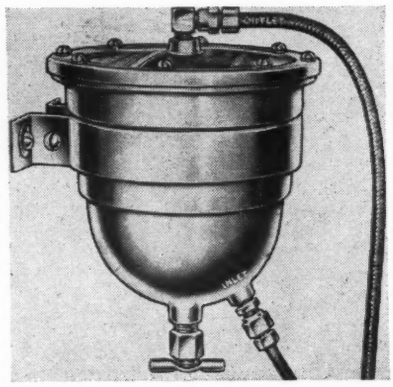
(*Continued from page 13*)

mountings in the rugged, double-drop, X-type frames used in both chassis. Crankcases are ventilated. Cooling is regulated by thermostatic control.

Double-action hydraulic brakes are standard on all models. The Hupp super-drive (over-drive), which is standard on the Senior Eight and optional on the Senior Six, provides effortless and economical driving at high speeds. At cruising speeds this transmission automatically reduces engine speed about thirty per cent.

Oil Cleaner Works On New Principle

A new motor oil cleaner that is said to remove all dirt, water and metal abrasives by separation rather than by absorption is announced by the Compton Car-Life Co., 5002 Broadway, Oakland, Cal. The Car-Life cleaner has a unique patented dirt-trap which is said to separate out all metal abrasives. The oil is then gently forced through three cellulose stripper-dams which strip sludge from the oil by separation. Another new feature is the self-washing cartridge. Every time the motor stops the accumulation of sludge on the bottom



of the separator dams is washed back into the dirt-trap where it can be easily flushed out at frequent intervals. Mr. Allen White, general manager of the Compton Company states that the cellulose cartridges do not become clogged with dirt, and therefore the effective life of the cartridge is greater.

A new bulletin giving complete information may be had by writing the manufacturer.

GIVE YOUR CUSTOMERS

Guaranteed Gasket Jobs

Armstrong-Victor Cork Gaskets are dependable. They are well-packaged and labeled. The Victor *Gasket List No. 27* and *Gasket Guide No. 12* make it easy to select the proper gaskets. Order these gaskets from your Victor jobber now.

ARMSTRONG VICTOR

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CORK GASKETS *and* HEADLAMP CORK

YOU NEED THIS LINE

LINKERT

PERFECT ENGINEERED PARTS FOR

CARBURETOR REPLACEMENTS

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109-124 ON CHEVROLET CARS 109-124
125-151 LINKERT 125-151
152-168 PERFECT REPLACEMENT PARTS 152-183
500-515 FOR CARTER BB CARBURETORS 500-515
516-551 ON PLYMOUTH CARS 516-551

CORRECT ASSORTMENTS FOR CHEVROLET AND PLYMOUTH

LANGSENKAMP-LINKERT CARBURETOR CO.

INDIANAPOLIS - INDIANA

NEW Deluxe EMBLEMIZED

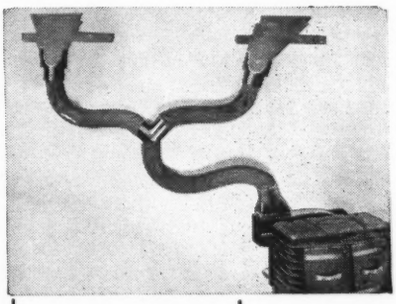
Sinko

Bronze Spin-Ur-Wheel & Gear Shift Ball

New "Rim-Mounting" Deluxe Spin-Ur-Wheel with medallion inserts of the Shrine, Knights of Columbus, Masons and St. Christopher in bronze are now ready for your customers. New large "Acorn" Gear Shift Ball completes matched sets. Fits all modern steering wheels—no band to deface outer rim. Fine choice of colors—red, onyx, green, yellow, grey, beige and brown. *Catalog on request.*

SINKO TOOL & MFG. COMPANY

351 N. Crawford Ave. Chicago, Ill.



DEFROSTER KITS

Built to fit all popular cars, including 1939 models. Tailor made to Factory Specifications of individual manufacturers. Defroster fittings easily and quickly installed under cowl—no holes to drill. The logical defroster to sell—attractively packaged, custom-built, complete with all fittings. Guaranteed satisfaction.

See our catalog No. 105 showing complete line of Winter Profit Makers, including:

- **Power Blower Heaters**
- **Heater Fittings**
- **Thermostats**
- **Defrosting Fans**
- **Tire Chains**
- **Radiator Covers**
- **Electric Defrosters**

Every Auto Need—One Dependable Source of Supply!

LION AUTO PARTS & MFG. CO. INC.

1920 S. Michigan Ave. CHICAGO, U.S.A.

2214 Main St. DALLAS, TEXAS

Atkins Hacksaw Blades Use New Steel

The special values claimed for molybdenum steel are brought to Atkins hacksaw used in A-Mol blades, trade marked with yellow ends instead of the familiar blue, manufactured by E. C. Atkins & Co., 418 South Illinois St., Indianapolis, Ind. The new blades are made in all standard sizes, lengths and widths for hand and power use.

New Stud Remover

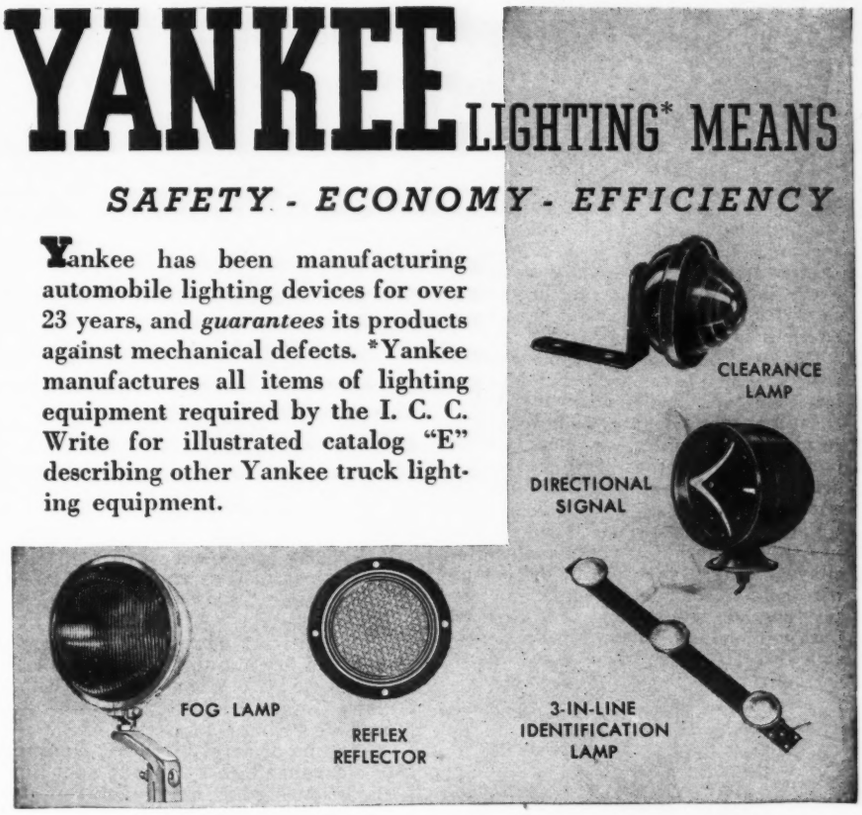
The National Machine & Tool Co., Jackson, Mich., has developed a new tool for loosening cylinder head studs. Listed under Catalog No. 557, the tool is a simple hydraulic device consisting of a hollow base that screws directly on to the stud, and a plunger.

A thin edge at the bottom of the base seats itself tightly on the cylinder head around the stud; penetrating oil is poured into the top of the base, the plunger is inserted, and two or three sharp blows with a hammer force the oil down through the tool and into the imbedded threads. Three narrow channels in the base of the tool direct the oil to the proper points.

YANKEE LIGHTING* MEANS

SAFETY - ECONOMY - EFFICIENCY

Yankee has been manufacturing automobile lighting devices for over 23 years, and *guarantees* its products against mechanical defects. *Yankee manufactures all items of lighting equipment required by the I. C. C. Write for illustrated catalog "E" describing other Yankee truck lighting equipment.



YANKEE METAL PRODUCTS CORP.
NORWALK, CONNECTICUT, U. S. A.

The Seal of Satisfaction
BLOK-SEAL

NEW Liquid Metal Saves Time, Money and Effort

The old long and costly welding jobs are out. Blok-Seal, the new liquid metal, perfectly and permanently repairs cracked or porous heads, blocks, valve ports and water jackets. Entire operation requires less than an hour. Blok-Seal is designated for all types of water-cooled internal combustion motors. Sold only in sealed tamper-proof cans for your protection.

Blok-Seal Laboratories
CAMDEN, N. J.

More Descriptions of 1939 Cars in the November Issue

Say!

Don't let car owners neglect the thermostat. It's an important moving part — can be a profitable part of your motor tune-up jobs and radiator service.

DOLE REPLACEMENT **Thermostats**

See page 69

● Made only of the best materials . . . by the most modern methods . . . Gardiner Acid-Core Solder assures uniform high quality results on every job. Its quick acting flux permits fast, clean work. Unusually high tensile strength insures lasting bonds.

Produced by modern methods exclusive with this company, Gardiner Solder costs less than "nameless" solders that lack its consistent performance and dependable results. No wonder car manufacturers, body builders, garages and repair shops everywhere standardize on Gardiner year after year.

For maximum satisfaction and economy in Acid and Rosin Core Solders in various alloys and core sizes . . . body, bar and wire solders, or special solders to meet any special requirement . . . specify Gardiner-made products. They're dependable . ALWAYS.

PACKED IN 1, 5, AND 20-LB. SPOOLS

Gardiner METAL CO.

4839 S. Campbell Ave., Chicago, Ill.

TOLEDO

VALVES ● GUIDES ● SPRINGS ● KEYS
SEAT INSERTS ● WATER PUMP PARTS
CHASSIS BOLTS AND BUSHINGS
TRYON SHACKLES
SILENT "U" SHACKLES
HARRIS SHACKLE BUSHINGS
ECCENTRIC TIE RODS ● PISTONS
CHROME-PLATED PISTON PINS
Write for Catalogs

The Toledo Steel Products Co.
3304 SUMMIT STREET
TOLEDO, OHIO, U. S. A.

Catalogs, etc.

(Continued from page 38)

what must be done to insure a reliable clutch repair job, and the methods in vogue for repairing present-day clutch assemblies. Copies will be sent upon request.

The Buffalo Pressed Steel Co., Inc., 4021 Mahoning Ave., Youngstown, Ohio, announce the completion of a new plant and the formation of an organization of a replacement sales department to serve the jobber direct and to control the sales policies for a more attractive service to the trade. They will specialize in "factory duplicates" designed to meet the critical engineering specifications of the car manufacturer, and have a new catalog and price sheet describing the "Buffalo" line of replacement mufflers and tail pipes. Free copies will be sent upon request.

An entirely new and different catalog has been published by The K-D Lamp Co., 610 West Court St., Cincinnati, Ohio. In addition to illustrating and describing in detail K-D's complete line of safety lighting equipment of clearance lights, fog and spot lights, direction signals and reflex reflectors, the new catalog carries a copy of the I.C.C. official lighting rules for trucks, buses and truck trailers and a summary of the individual state requirements covering lighting and signalling equipment. Write today for your copy of this valuable catalog.

An attractive, sturdily built instrument display stand, known as Model T-14, has been introduced by C. E. Niehoff & Co., 232 W. Superior St., Chicago, Ill. It is of all-steel construction, mounted on rubber covered casters, with shelf at top for testing instruments and another shelf below for battery, tools and parts. The stand can be rolled to the job, with all necessary equipment for doing the work. It is finished in bright orange and black duco, is 50 in. high, 38 in. wide and 18 in. deep. Time payment plans are available. For complete information and prices, write the manufacturer.

The National Battery Manufacturers Association, 7 East 44th Street, New York City, has just issued its fourth statistical yearbook of the industry, which is offered to the membership and other interested parties at 25 cents for single copies.

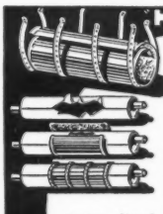
WESCO Chains

More Sales with Smaller Stock!

Eliminate dead investment by stocking WESCO Tire Chains—only a few sizes needed to fit 90% of all makes of cars! High Profits—Fast Selling . . . merchandised right for sales by sight . . . neatly packed in bright, eye-appealing cartons. WESCO builds a better chain—then helps you sell it faster! Heavier, stronger, snappier, they give complete satisfaction and build good will and repeat business . . . write today for complete information . . . special dealers' prices now in effect!

WESCO Dual Grip Emergency Chains have every selling feature . . . non-turning, easy on and off, self-tightening, double locking. Send for circular.

Western Chain Products Co.
1812 Belmont Ave. Chicago, U. S. A.



HOOK ON

Cut Costs!

Repair Rusted, Blown-out Mufflers at low cost . . . in 15 minutes!

Repair rusted and blown-out mufflers with HOOK-ON Muffler Repair Jackets and save costs of new mufflers and high installation charges! Made of asbestos lined heavy-gauge steel. Flips over rusted and broken parts in a second and seals permanently with 4-all around clamps. You can't afford to pass up this opportunity for good business!

No. 50 HOOKS-ONS, Box of 6.....$3.60
Postpaid if check accompanies order.

JOBBERS WANTED

SPRING SPECIALTY CO.
7 N. 8th Ave., Maywood, Ill.

U.S. PAT. NO. 2,107,588

10 Minutes

. . in your own shop . . to TURN and UNDERCUT A COMMUTATOR with the new 2-IN-1.

SMART TOOL

FIRST and ONLY LOW-PRICED Unit for Servicing Armatures! Superior to a Lathe!

Ask Your Jobber.

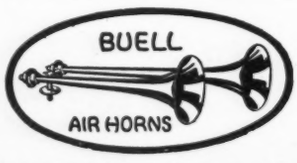
SMART TOOLS, INC. Dept. A
FALL RIVER, MASSACHUSETTS

Pin Hole Honing is Cheaper and Better than Reaming

● Never a dull tool or blade-marked hole; small investment; nothing to sharpen; no guess-work or inaccurate fits. Low cost replacement Abrasives; Micrometer Adjustment. Makes ANY mechanic an expert pin fitter. Ask your Jobber today for Standard or Heavy Duty Pin Hone Set you need.

3-TOOL SET $26

HALL PISTON PIN HOLE HONE



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A Horn so Good it makes a Salesman out of every customer.
Prices as low as $7.50 for Horn Only.
Literature available on New Motor Controlled Fog or Driving Light.

BUELL MANUFACTURING COMPANY
2983 Cottage Grove Ave., Chicago, Ill.

CLEAR PROFIT!

HANDY Battery Chargers operate at a lower cost, pay for themselves quickly, and then it's all Clear Profit. 2-yr. guarantee.

WRITE FOR BULLETIN $29.50

BALDOR ELECTRIC CO.
4375 Duncan Ave., St. Louis

Handy BATTERY CHARGERS

Maintenance Men

who read

MOTOR AGE

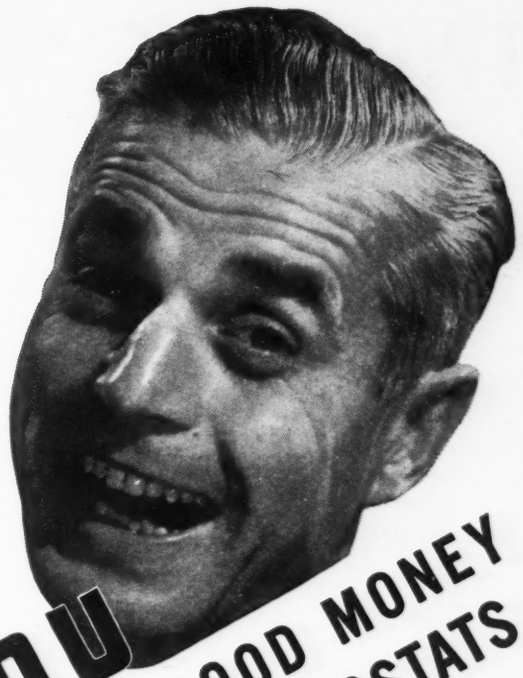
Account for

85% plus

of all the business

done in this

Important Field

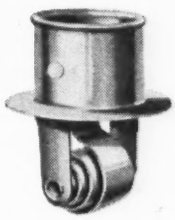


YOU CAN MAKE GOOD MONEY REPLACING THERMOSTATS

● Today Thermostats for motor temperature control are standard equipment on nearly all cars so you can be sure they have definite, important work to do.

Further, Thermostats are a moving part of the car so they require periodic checking—to be sure they are on the job.

Although the Thermostat is a scientific device of vital importance it is usually cheaper and much more satisfactory to install a new one than testing and repair. Nine out of ten motorists will be interested when you explain how much gas, oil and engine wear can be saved with the quick warm-up assured by an efficient Thermostat. Most of them will let you replace the unit with a new Dole Thermostat while they are having the car tuned up or even if you are just flushing the cooling system or filling it with anti-freeze.



For about $1.00, for most cars, with a good profit and easy to install, you can make extra sales in quick time. Alert service station, repair shop men, and dealers are keeping a stock of Dole Replacement Thermostats this year—eleven models to take care of most everybody.

Place your order today through regular channels.

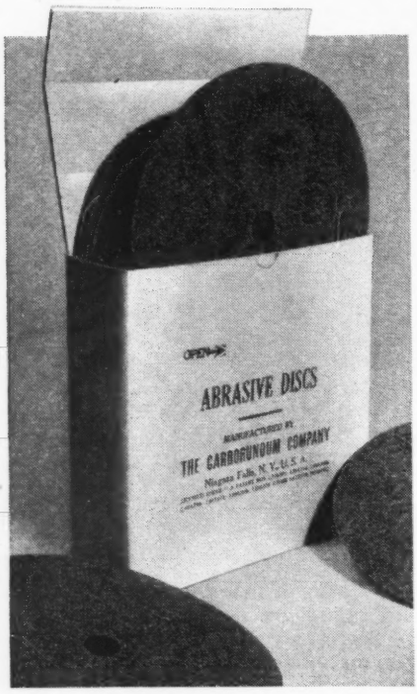
THE DOLE VALVE COMPANY, 1901-1941 Carroll Ave., Chicago, Ill.

Offices and Representatives in all Principal Cities

DOLE REPLACEMENT Thermostats

TWO WAYS TO SAVE

ON DISCS AND CLOTH



● You effect economies in *two* important ways when you use Aloxite Brand Aluminum Oxide sanding discs. *First* because they're long-lasting. *Second* because they're fast-cutting.

You make these same *two* savings when you use Aloxite Brand Aluminum Oxide "Electrocoated" sanding cloth. For this cloth *cuts fast* and *stands up longer.*
Next time you order abrasive discs or cloth, ask your jobber for Carborundum-made products and cut costs in these two ways.

THE CARBORUNDUM COMPANY
REG. U. S. PAT. OFF.
Niagara Falls, N. Y.

Sales Offices and Warehouses in New York, Chicago, Philadelphia, Detroit, Cleveland, Boston, Pittsburgh, Cincinnati, Grand Rapids

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CARBORUNDUM
REG. U.S. BRAND PAT. OFF.
ABRASIVE PRODUCTS

Plymouth

(Continued from page 15)

insulating material has been added this year—consisting of whipped-up cellulose allowed to solidify while still in the foaming stage, which is applied in an inch-thick blanket to the dash panel inside the car.

All sheet-metal parts are rust-proofed. Standard colors for 1939 include silver-wing gray, gun metal, pottery blue, aviator blue, amphibian green, Hampton beige and black. The 1939 Plymouth line includes five Road King and eight de luxe body types, all mounted on a chassis of 114-in. wheelbase and equipped with the same 82-hp. engine.

Tropic-Aire Introduces The Fordex Heater

A new heater designed especially for Ford V-8 cars has been announced by Tropic-Aire, Inc., 4501 West Augusta Blvd., Chicago, Ill. To insure abundant heat, the new heater is made with ¾ in. inlet and outlet pipes and uses a 7¼ in. blower wheel which delivers over 4000 lineal feet of heated air per minute, according to the manufacturer. It is easily installed in the center of the dash, allowing room for the battery, radio and gear shift lever. The heater package contains not only the heater but

also the necessary fittings and an adjustable thermostat designed for this installation, leaving nothing more for the dealer to buy.

Supplied at extra cost for use with this or any other heater in the Tropic-Aire line is a fresh air intake which takes in fresh air through the radiator, filters it of dust, dirt and impurities and directs it to the heater for distribution inside the car.

FOR THAT PAINT JOB use a—

MASTER Striper SET

These lines represent available stripe widths.

"EYE APPEAL MEANS BUY APPEAL"
An Approved Tool—for every Modern Paint Shop—Easy to use—Does better work—faster. Exclusive Features.
Prices: sets $1.50 to $13.50.
Ask your Paint Jobber or write for literature.
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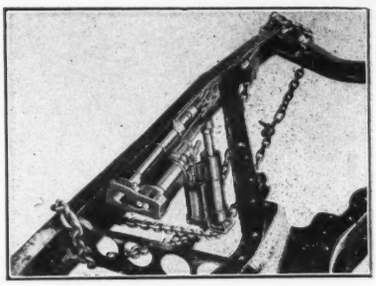
2533 N. Ashland Ave. CHICAGO, ILL.



DROPPED FRAMES ARE EASY WORK FOR *POWER PLUS*

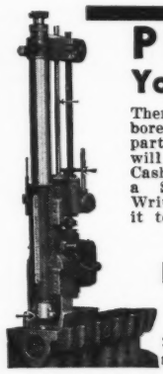
For dropped frames at point in frame where X joins channel, Perfection POWER PLUS Hydraulic Jack makes hard work easy by laying in channel and extending frame to its original position.

You'll find Perfection Power Plus' two modern hydraulic units make easy work of all body aligning, frame work, fender straightening, rear axle housing, bumper straightening, knee action adjustment, steel running board straightening.

Speed, Power, Dependability, Accessibility, Adaptability—you'll find all five in the Perfection Power Plus Jack, the only double-acting PUSH-PULL hydraulic jack.

G. A. C. MANUFACTURING CO.
ASHLAND, OHIO

We are telling 40,000,000 MOTORISTS:
EVEREADY PRESTONE
TRADE-MARKS
ANTI-FREEZE
Costs More by the Gallon... LESS by the Winter
WILL YOU CASH IN?



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There's REAL profit in re-bore jobs. And your new part sales and extra servicing will increase tremendously. Cash in on the profits with a SUPERIOR Boring Bar. Write for our new bulletin—it tells the complete story

SUPERIOR BORING BARS

ST. LOUIS TOOL CO.
2315 N. 9th St., St. Louis, Mo.

- FOUND -

A tool that loosens corroded cylinder head studs in minutes - not hours. The National Hydraulic Action Tool has a hollow base which screws on stud, seating itself firmly on cylinder head. Half-fill with oil, insert plunger, strike with hammer - - and the stud is ready to turn out.

557 (3/8" - 24 thread) 75c
557A (7/16"-20 thread) 80c
557B (1/2" - 20 thread) 85c

NATIONAL MACHINE & TOOL CO.
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